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Amateur Televison Quarterly

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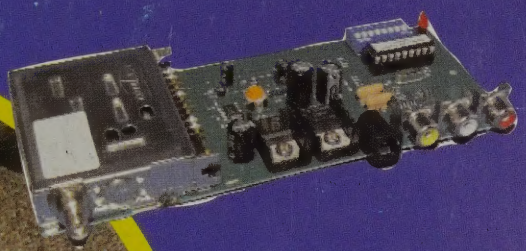

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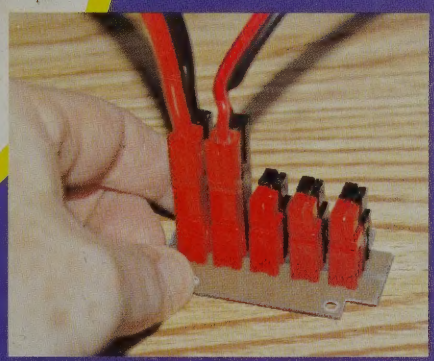

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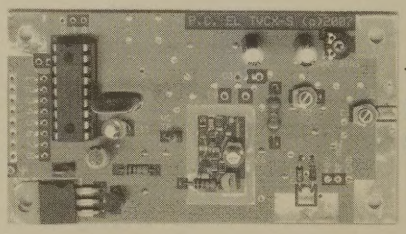

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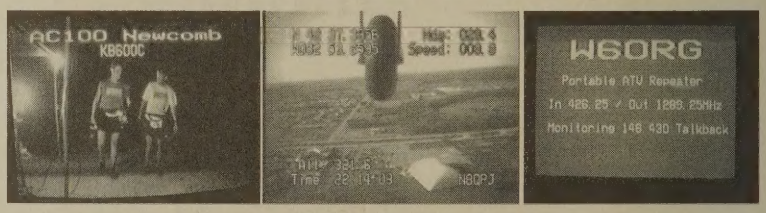

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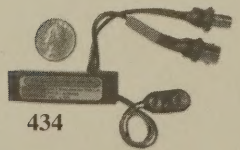

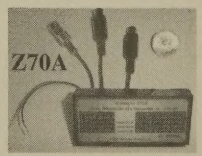

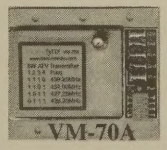

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Amateur Television Quarterly

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Editors Notes

This was a fun issue to put together and I hope you enjoy the information and articles. Even I wrote a couple of the articles. One of the articles on how to make a PC board easily, would make most people wonder if I had lost my mind, but it really is easy. Years ago I made PC boards, and it was not easy, making negatives, putting resist on the bare board, exposing to UV light for a while, 'developing' the board, sometimes starting over when the resist did not look just right, and finally etching with Ferric Chloride. The last step you still have to do, but I describe how you can make a circuit board in 15 minutes. I know it is hard to believe, but it worked for me.

Also, we are now carrying the Comtech transmitters and receivers for 900, 1200, and 2400 MHz. The last two years at Dayton I had requests for these boards, and last year I had a few and they sold. What I have done since is to put my programming skills back to work. I have not really done any programming to speak of for maybe 10 years or more, and then it was Motorola microprocessors. These units take a Microchip PIC so I had to re-learn a few things. But it came back quickly and I had a lot of fun. So, the programmed chip that comes with these boards is one I made as what gets shipped from Taiwan have frequencies that are not usable in the USA.

Another article I wrote is about the program Crazy Talk. It is such a fun program to use, and you can make any "picture" talk. Yes, you can take a picture of your pet dog or cat, and record what you want them to say and they will obey!

The photo below, shot by my son, Shawn, KA9BXA, as he was feeding the squirrel would be a great candidate. Especially if you do a little photo modifying and replace the food with a hand holding a mike as if for an interview. I wonder what the squirrel would have to say?

I am hoping to go to Dayton this year but will not have a booth due to health problems. That means I will be able to spend more time visiting with all of you, maybe hang out some at the ATN booth. Also, I love to attend the forums and should be able to pick a bunch to attend. Hopefully I will not buy so much stuff that I can not fit it in the van.

We need some band openings for sure. ATV activity seems to be down and a band opening would sure give us a boost. Anyone know how to do the tropospheric dance? Might be worth a try anyway.

Our local repeater is going to try something different (for us) for the video ID. We are going to switch to the outside camera in the daytime with video overlay, and when it gets dark (and you would not see much from the camera) go back to the regular full screen ID from ELK. So, I need to design a little circuit that will detect daylight or not and switch a relay. Should not be too hard and when done I will report on it here.

Hope everyone had a great Holiday Season.

Gene - WB9MMM
ATVQ

A Loosing Proposition

By: Harold Kinley, WA4GIB Email: radiotech@charter.net
204 Tanglewylde Drive
Spartanburg, SC 29301

Imagine an RF transmission line without any RF attenuation. All the power from the transmitter would be delivered to the antenna. Conversely, all the signal from the antenna would be delivered, unattenuated, to the receiver input.

To understand the effects of transmission line attenuation on the transmitter signal, we will examine three basic examples: one with a theoretically lossless transmission line and a mismatched load, one with a lossy transmission line with a mismatched load and one with a lossy transmission line with a matched load. In this discussion it is assumed that a single point of reflection exists on the line, and that is at the load or antenna.

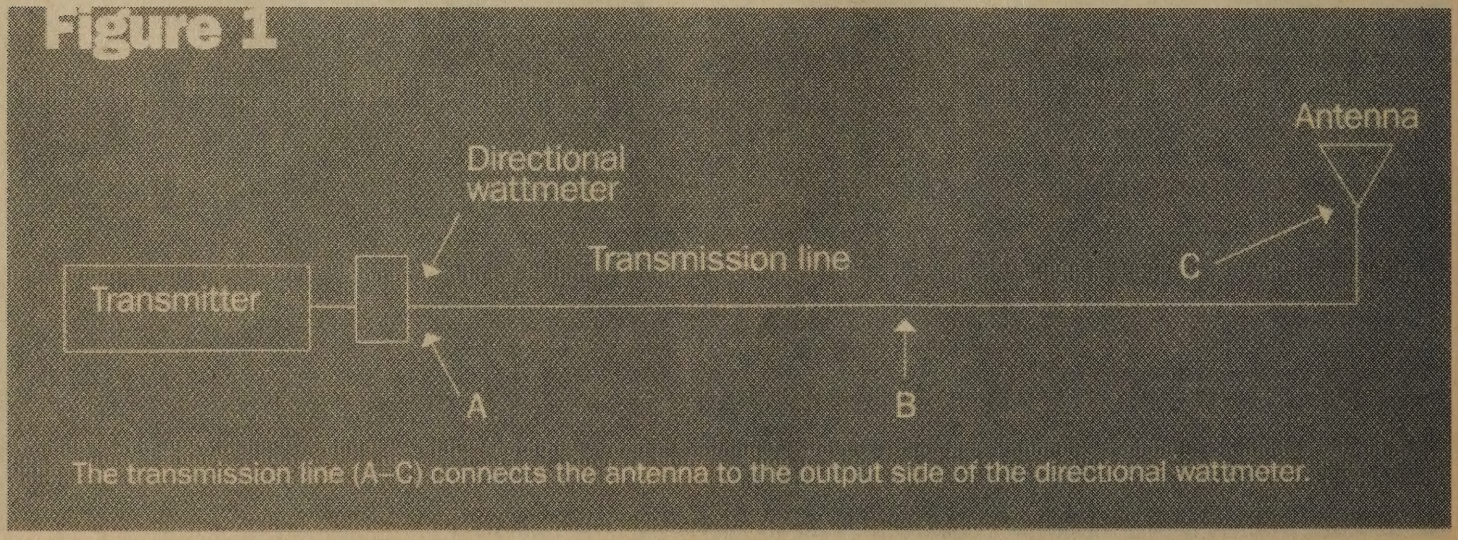
Let's look at the effect of RF attenuation on a transmission line that connects a radio transceiver to the antenna through a lossless line. A typical base station setup used with land mobile radios is shown in Figure 1. A transmitter is connected to an antenna through a length of transmission line, which is represented by A-C. Let's analyze this setup based on the traveling wave concept. Assume, for this discussion, that the antenna mismatch is such that the directional wattmeter, at position A, indicates 100 W in the forward direction and 20 W in the reverse direction. In a lossless transmission line, the power or voltage in the forward wave will be at the same level at any point on the transmission line. Similarly, the voltage or power in the reflected wave will be at the same level at any point on the transmission line.

Because the power (either forward or reflected) is the same at any point along the line, the voltage standing wave ratio (VSWR) also will be the same at any point along the line. In addition, the power delivered to the antenna will be equal to the difference between the measured forward power and the measured reflected power (100 W - 20 W = 80 W). This means that there is 20% reflected power. According to Table 1, this represents a VSWR of 2.62:1. Note that this VSWR will be the same at any point on the line because the line is lossless.

Now, let's assume that the transmission line in Figure 1 has an end-to-end loss, or RF attenuation, of 3 dB at the operating frequency. This changes things quite a bit. Let's examine the situation more closely. Assuming that we are using the same antenna, the percentage of power reflected from the antenna will be the same. However, the actual amount of RF power reflected will not be the same. This is because the line loss of 3 dB causes a 50% loss of power between the wattmeter and the antenna.

Again, suppose that the wattmeter indicates a forward power of 100 W at point A. A line loss of 3 dB means that only 50 W is reaching the antenna at point C. Using the same antenna means that 20% of this power will be reflected, so the reflected power is equal to 10 W. As a result, the power in the reflected wave at point C is 10 W. However, in traveling back down the line toward the transmitter, the line loss diminishes this reflected power to 5 W at point A. Moreover, the power at point A in the forward wave is 100 W, while the power in the reflected wave is 5 W. Thus, the percentage of reflected power has changed from 20% to 5%. Accordingly, the VSWR has changed from 2.62:1 to 1.58:1 between points C and A on the line. (See Table 1.) At point B, the VSWR would be less than at point C, but more than at point A.

The power radiated by the antenna is equal to the net power, or the difference between the forward and reflected power at the antenna. In this case, the radiated power is equal to 50 W - 10 W = 40 W. Yet the net power delivered to the line at point A is 100 W - 5 W = 95 W.



Let's assume that a new antenna is installed that properly matches the system impedance (50 ohms). Using the line with 3 dB loss, the forward power at the antenna is 50 W and the reflected power is 0 W. Thus, the VSWR at the antenna is 1:1. This means that all the forward power (50 W) is radiated. Thus, the amount of power wasted in the line is 50 W because the forward power at point A is 100 W. In each example, we will compare the net power radiated by the antenna to the net power at point A to determine the actual line loss in decibels.

In the first example, there was no line loss, so the transmitted power is simply equal to the difference between the forward power and the reflected power at point A. In the second example, the forward power at the antenna (point C) was 50 W and the reflected power was 10 W; accordingly, the net power is 40 W. At the input side of the line at point A, the difference between the forward and reflected power results in net power of 95 W. By comparing the net input power with the net output power we can determine the net line loss. In this example, the net line loss in decibels is shown in Equation 1.

In the third example the antenna was matched to the 50-ohm system impedance, so there is no reflected power and the radiated power is 50 W. Thus, the line loss is 3 dB. Compare this with the line loss in the second example, where there was a mismatch at the antenna. The additional loss caused by such a mismatch is equal to 0.76 dB (3.76 dB - 3 dB). This extra line loss (above the normal matched line loss) increases with normal transmission line loss; it also increases with higher VSWR at the antenna. Remember, in the first example there was a mismatch at the antenna but no line loss, and the net input power at point A was equal to the net output power at point C, the antenna. In the second example, the VSWR at the antenna was 2.62:1 while the directional wattmeter readings indicated that the VSWR at the input side of the line was only 1.58:1.

It is important to note that the line loss actually masked the VSWR that existed at the antenna. This is quite misleading; the line loss must be taken into consideration when trying to determine the VSWR at the input side of the transmission line. This discussion assumes that the reflection is a single-point reflection occurring at the antenna (point C).

The VSWR can be calculated from the forward and reflected power. In the first example the forward power at point A on the line was 100 W and the reflected power was 20 W. From this, assuming a 50-ohm line, we can calculate the voltage in the forward and reflected waves. The calculation is shown in Equation 2. In this equation, Ef represents voltage in the forward wave, P represents power in the forward wave and Z represents the system impedance. The voltage in the reflected wave is calculated as shown in Equation 3, where Er represents voltage in the reflected wave.

Now that we know the voltages in the forward and reflected waves, we can calculate the VSWR as shown in Equation 4. In most cases, the RF attenuation of the transmission line is undesirable and causes a waste of RF power. In planning a base station and the desired coverage area, software usually is used to determine the antenna height and power required to provide adequate coverage of the desired area. Suppose the system required a minimum of 300 W of effective radiated power (ERP) at a given location and antenna height. Further suppose that the transmitter power is limited to 100 W and the antenna gain is 6 dBd. If the line loss were 0 dB, then the ERP would be 400 W. The loss of the required transmission line should not exceed 1.25 dB. (See Equation 5.)

From this, it is obvious that a transmission line with a loss no greater than 1.25 dB at the operating frequency must be used. Consult manufacturer's catalogs to find the cable that offers RF attenuation (at the required length) of no more than 1.25 dB. Attenuation values are usually specified in terms of dB/100 feet. If the required cable length is 200 feet, the attenuation should be no more than 1.25 dB/2, or 0.625 dB/100 feet.

Many amateur radio operators and experimenters choose to use an open-wire feeder, sometimes called a ladder line or window line. (Technically speaking, however, ladder lines and window lines are not the same.) These are very low-loss transmission lines that can handle high VSWR without causing any significant additional line loss. Typically, these types of transmission lines are not suitable for use in commercial land mobile radio applications.

It should be noted that a high VSWR seen at the transmitter output could trigger the protective foldback circuit, which causes a reduction of transmitter output power. This protective circuit prevents blowing RF output transistors. The power reduction caused by the triggering of this protective circuitry is as significant as the additional line loss caused by a high VSWR.

This discussion has centered around the effects of line loss on the transmitted signal. In a future issue we will look at the effects of line loss on the received signal.

Until next time, stay tuned!

Table 1

Reflected power (%)	Voltage standing wave ratio (VSWR)
5	1.58
10	1.92
15	2.26
20	2.62
35	3.00
30	3.42
35	3.90
40	4.44
45	5.08
50	5.83

Equation 1

L = 10log (40/95) = 3.76 dB

Equation 2

Ef = â^šPZ = â^š100 Ã— 50 = â^š5000 =70.7 V

Equation 3

Er = â^šPZ = â^š20 Ã— 50 = â^š1000 =31.6 V

Equation 4

VSWR= Ef + Er/Ef - Er 70.7 + 31.6/70.7 - 31.6 = 102.3/39.1 = 2.62:1

Equation 5

L = 10log P1/P2 = 10log 300/400 = 10log (0.75) = 1.25 dB

ATVQ

SSTV friends !

A big tip of the hat this autumn 2007 to our 50 years old Analog SSTV mode. I was prepared for this celebration next year but Mr Copthorne Macdonald (Cop), YV2CM mailed me:

Hello Nils
I completed the first working equipment in the autumn of 1957, and conducted the first successful on air tests on the 11 meter band at that time. I then wrote a paper describing the system -- a paper that won, in the spring of 1958, national first prize in the 1958 student paper competition of the American Institute of Electrical Engineers. The first published description of the system in the ham radio press was the two-part article I wrote for QST that appeared in the August and September 1958 issues. So technically, SSTV was born in 1957.

73 Cop VY2CM

Nis SM5EEP, SSTV operator since 1969.

Amateur Television Makes Its Debut at the October 6th SET in Kent County, MI

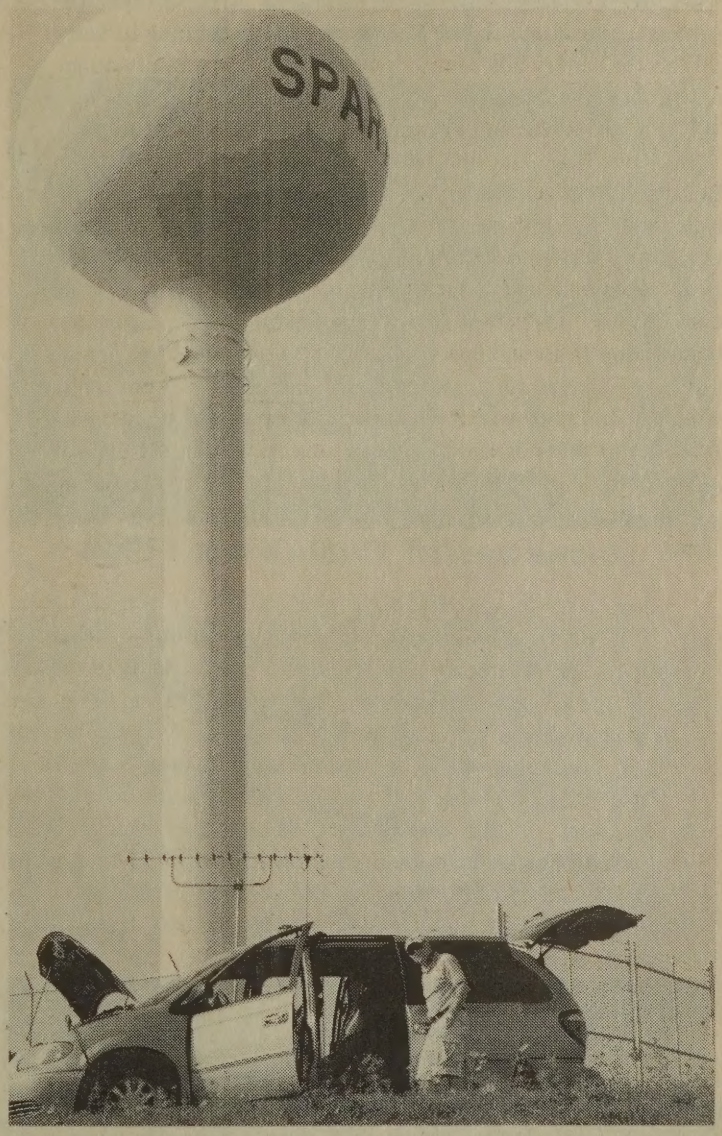
By Ron Fredricks, K8DMR Email:ronfredricks3@comcast.net
2046 Foxboro Ct. NW
Grand Rapids, MI 49504

The purpose of this article is to show that just a couple of ATVers working together can demonstrate the usefulness of ATV for emergency communications to agencies such as the Red Cross. You do not need to wait for a full up ATV emergency repeater to be funded and built in your area. Why not ask your local EOC or Red Cross Communications chair to add ATV to their next emergency test or drill?

For the first time amateur television (ATV) was employed as part of the Grand Rapids Amateur Radio Association's (GRARA) emergency communications suite. This was at the recent Simulated Emergency Test (SET) conducted by the local ARES/RACES and the newly formed Red Cross Communication Team (RCCT) on Saturday morning October 6th, 2007. The RCCT is composed of volunteer members (some also ARES/RACES volunteers as well) under the leadership of WD8USA Joe Bell, the Red Cross of Greater Grand Rapids Communications Chair and also the current "GRARA captain" of the RCCT. It concentrates on working strictly with the Red Cross rather than the police, fire and medical "first responders" that ARES and RACES primarily serve. Heading up the ATV demo that day for the RCCT was Ron Fredricks, K8DMR, assisted by Dick Corey, W8IMA, both active Grand Rapids area ATVers

The ATV demonstration was associated with the RCCT SET activities at the northern Kent county simulated disaster holding site, namely the high school in Sparta, MI, about 15 airline miles from the Red Cross. A Red Cross emergency van (EV1) was dispatched to the high school parking lot at 8:30 AM to provide simulated disaster communication via FM and packet links back to the Red Cross building on Fuller N.E. using portable 2m, 220 and 440 antennas. (A second emergency vehicle, EV2, was dispatched to the southern part of the county with RCCT volunteers but there was no ATV from that location, just regular FM and packet messages.)

Ron's ATV mobile was used to send full color video on 439.25 MHz from the Sparta high school parking lot back to the Red Cross along with the usual emergency message traffic. Sound communication to accompany the video was via the 147.26 GRARA repeater, although in the future it would be carried right along with the video. The video was then broadcast from the Red Cross building on 421.25 MHz using the co-located K8DMR ATV repeater. RCCT and Red Cross volunteers working in the Red Cross building's radio room were able to view the full motion video on a local monitor there throughout the morning.



The basic setup for the ATV demonstration involved using a 1.2 GHz FM video output "COP" transmitter purchased by Ron some years ago from PC Electronics at Dayton. Ron rigged up a 15 volt battery power pack from AA batteries so that the COP became a true "creepie peepie" portable video sender. A battery powered handy-cam was mounted on a tripod in the school parking lot next to the EV and a 6 dB 1.2 GHz collinear borrowed from Dennis, KC8LZK, and mounted on W8IMA's car roof served for the transmitting antenna. Propagation on 1.2 GHz is almost always line-of-sight (1-2 miles or less with trees). In turn K8DMR parked his ATV mobile as far up the hill by the high school as possible and used a 1.2 GHz Bensat receiver also

purchased from PC Electronics to convert the wideband FM video to baseband video and audio (The 1.2 GHz receiver is AC powered so a cigarette lighter plug inverter was used to power it).

Ron's ATV mobile includes a tri-band collinear with 11 dB gain on 1.2 GHz and this was used with the Bensat receiver. The "creepie peepie" signal from the parking lot was then re-modulated on a 1 watt peak AM ATV exciter operating at 439.25 MHz. The exciter power was boosted up to 40 watts (sync tip power) using Ron's 2-100 Mirage amplifiers running directly off the car battery and sent to a 48 element horizontally polarized transmit antenna pointed at the Red Cross. This produced "P5" i.e. snow-free color pictures at the Red Cross building

Because of the ~ 15 mile distance and the intervening 10 mile road high ridge between the Sparta site and the Red Cross building, it was necessary to run more power than Ron usually does from the mobile and use a beam antenna. Thus, instead of the usual 10 watt peak amplifier which runs off another cigarette lighter plug Ron employed his home ATV station amplifier and instead of his van roof mounted omni-directional 70 cm loop antenna, Ron borrowed a 48 element "J-beam" ATV antenna from Philip W8IPN, another active area ATVer and RCCT volunteer. Ron and Dick then set the beam up on a tripod and mast placed next to the mobile and pointed the antenna at the Red Cross.

By way of comparison running the mobile by itself at Sparta could just bring up the ATV repeater in Grand Rapids when parked on the hillside by the high school. With the beam antenna and 10 watts from the small amplifier the received signals were snowy but watchable B&W at the Red-X. However with the additional power the signal went full color and essentially snow-free, i.e. P5. Fortunately, Ron had been up to Sparta the week before the SET for his own mobile tests and thus knew, in advance, what would be necessary for sending reliable video back to the Red Cross.

Hopefully this will be the start of continued ATV participation in all future SET drills and other local emergency drills as well in support of the Red Cross and the RCCT. Other clubs such as the Saginaw Valley Amateur Radio Association have gone into ATV as part of their Emergency Communications plans in a big way including receiving a major grant to setup a 3-band input (900, 1.2, 2.3) and 1.2 GHz output emergency ATV repeater. That repeater is now operational. Saginaw being on the wrong side of the 70 cm band's "green-line" cannot use the much more reliable (non line-of-sight) 421.25 output that Grand Rapids is able to employ as an in-band repeater. We should continue to build on this capability.

Here are some shots of the K8DMR ATV Mobile on site. No, Ron's van was not in a wreck. He was just keeping it cool with the engine running and the temperature going up to 85 degrees that day.

22nd ANNUAL ATV BANQUET 11-11-2007 LITCHFIELD, ILLINOIS

Scott Millick, K9SM - Email: smillick@wamusa.com
222 N. Jackson St.
Litchfield, Illinois 62056
Photo Credits: Ben Kingingham - K9IDQ
Email: k9idq73@pngusa.net

A clear breezy 65 degree day provided a pleasant trip for ATV'ers traveling to the twenty-second annual Central Illinois/St. Louis Area Amateur Television Club's banquet at the Ariston Restaurant in Litchfield, Illinois. This location serves as a central meeting point for the club with members attending from the Bloomington, Mt. Vernon, Springfield, Champaign, Canton, Macomb, Creal Springs, Illinois and St. Louis, Missouri areas

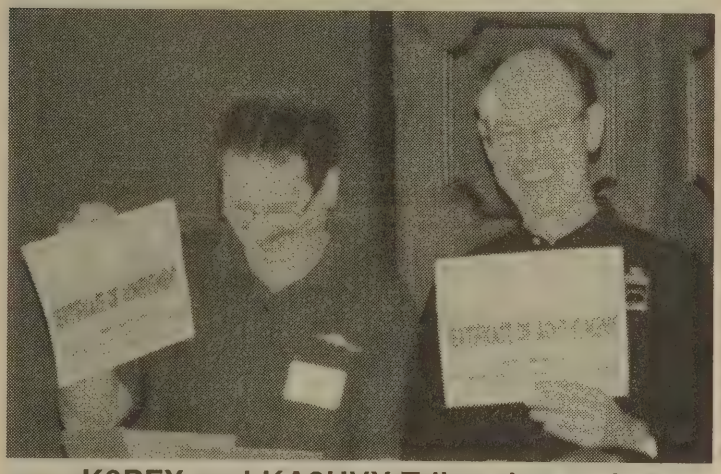
KB9WLM parts bin joke prize

This dedicated group of ATV operators arrived for another evening of renewing friendships and meeting new members with 40 members attending the banquet this year.

Bob, KA9UVY, Shannon, KB9BIE, and Jim, KA9EGM, from the Mt. Vernon and Centralia Illinois areas arrived first this year with others following shortly. Soon the talk about ATV openings, contesting, and equipment reverberated throughout the room.

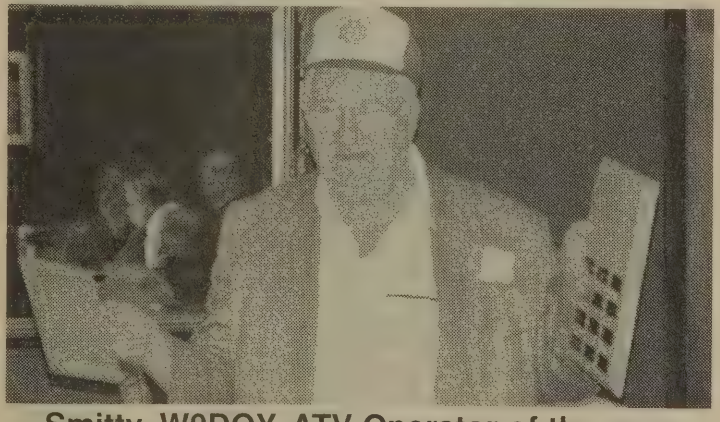
The group was called to order at 5 PM by Scotty, K9SM, and after a few announcements the clatter of dishes, glasses, utensils and chit chat continued throughout the course of a great meal and delicious desserts.

The program began with four special awards presented this year



K0PFX and KA9UVY Triband awards

at the banquet by K9SM. Bob, KA9UVY, was given a small statue for his new nickname 'The Mouth of the South'. Leonard, N9XHU, was given a Bensat receiver repair kit consisting of a rubber mallet and screwdriver to help him in his tireless efforts to make the receiver work. Larry, KB9WLM, was given some containers to put parts in as he is constantly having problems locating a part he needs. Bob, KA9UVY, and Mel, K0PFX, were awarded special certificates that no one in the world has. The K9SM Tri-Band Award is presented for two-way ATV contacts with his station on the 439.35, 900 and 1200 MHZ bands. Bob and Mel are the only ones to accomplish this so far.



Smitty, W0DQY, ATV Operator of the year

Gene Harlan, WB9MMM, publisher of ATVQ Magazine, sent certificates to the club members attending who were winners of the recent ATVQ Contest. The following received their certificates at the banquet; Ben Kiningham, K9IDQ, placed 8th, Jim

KC9BIE ATV Mobile

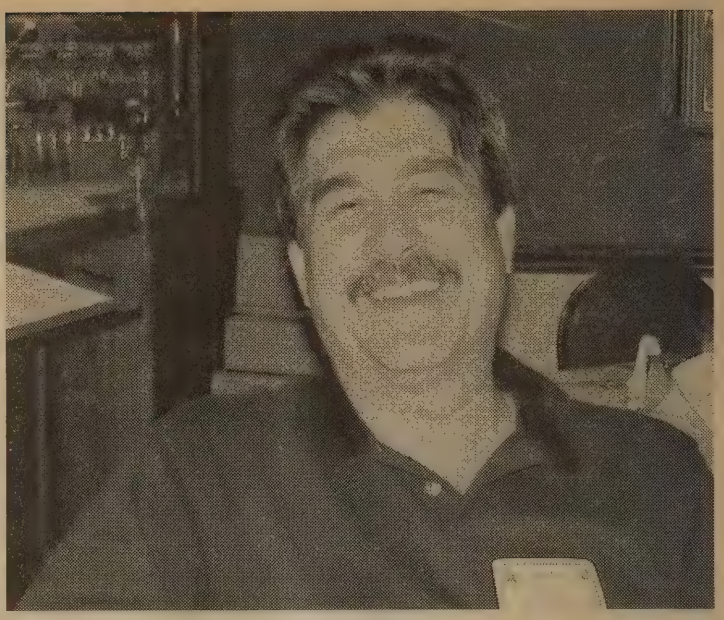
Brueggman, KA9EGM, 6th, Scott Millick, K9SM, 3rd, Leonard McWhorter, N9XHU, was 2nd. Bob, KA9UVY, was given a special Beacon Award' certificate and beacon kit for the countless hours he devotes to amateur television by helping organize the contest and serving as a beacon for the rest of the group.

Glenn Smith, W0DQY, was given the seventeenth Central Illinois/St. Louis Area ATV Operator of the Year. Glenn, or Smitty' as he is known as, from St. Charles, MO. is a local VHF/UHF pioneer in the St. Louis area and has been active for many years on ATV.

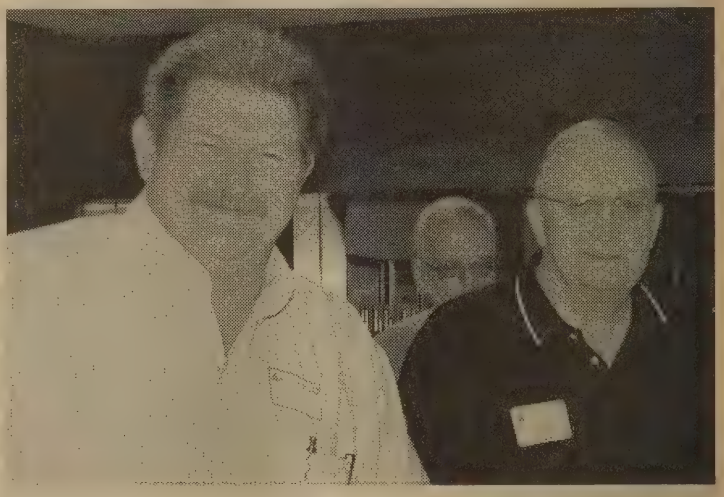
XYL of N3VL, KA9UVY, & KC9BIE

The first part of the program was a talk and display of using the internet to show what your ATV signal looks like at the received station. Bob, KA9UVY, set up and showed his site as well as others that are using this new technology. A base at the restaurant and Shannon's, KB9BIE, mobile signals were shown on the internet from K9SM's station in Litchfield at the restaurant's WiFi spot who along with Mel, K0PFX, also have this set up.

The second portion was given by Mel, K0PFX, whose excellent power point presentation shows how digital voice is being used on the HF bands. Mel is one of the early users of this new technology and has made many contacts using the different digital voice formats. He stated if you can run RTTY or PSK31. You



WD9T



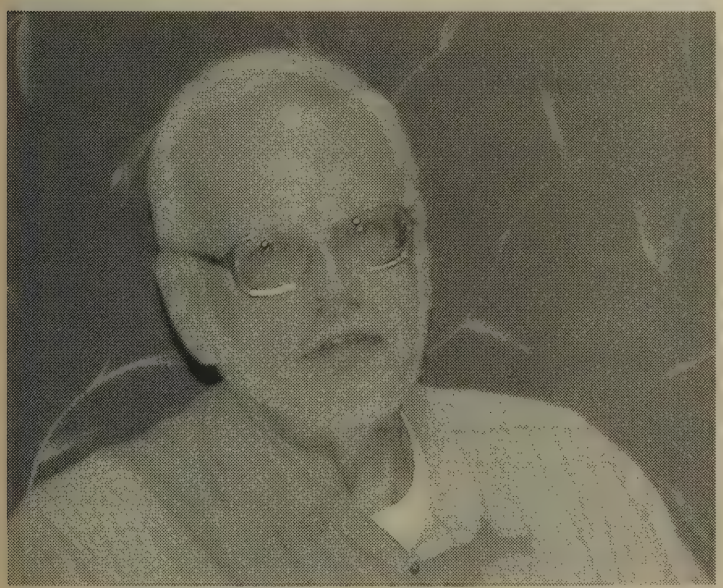
David, KA9BWD & Lou, K9LJR

SZX, N9RIX, and Molly

Reba Mathis, N9END, Troy, IL
& Kathy Millick, WB9QLY, Litchfield, IL

too can join this new mode on HF.

The famous prize drawing followed which included a Bird wattmeter, Heil headset, and a M2 antenna serving as the main prizes. The drawing provided a lot of fun and laughs. The first person's name drawn had their choice of any three of any of the 170 plus prizes on the first round. After that every person whose name was called could select 3 prizes from the prize table or take a prize from someone who had already chosen one. That person then selects a replacement from the prize table. This led to some of the main prizes changing hands over two dozen times. Everyone left with at least four prizes. The Bird wattmeter was won by Lou Rempe, K9LJR, from Clinton, Illinois who was thrilled with his new toy. Rick, WD9HRU, from Bloomington, IL. won the M2 antenna and Judy Reynolds, KA9ACM, from Hillsboro, IL. won the Heil headset.



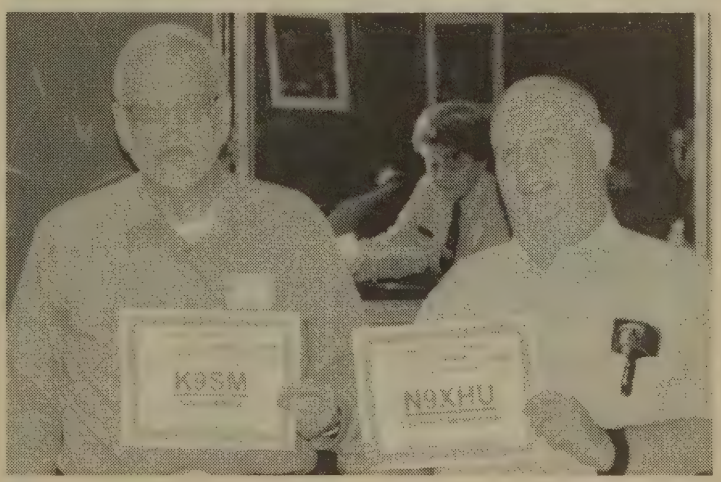
Scott Millick, K9SM, Litchfield, IL

After the drawing more visiting followed and farewells were said. Everyone made their way home and is looking forward to the next banquet scheduled for November 9, 2008.

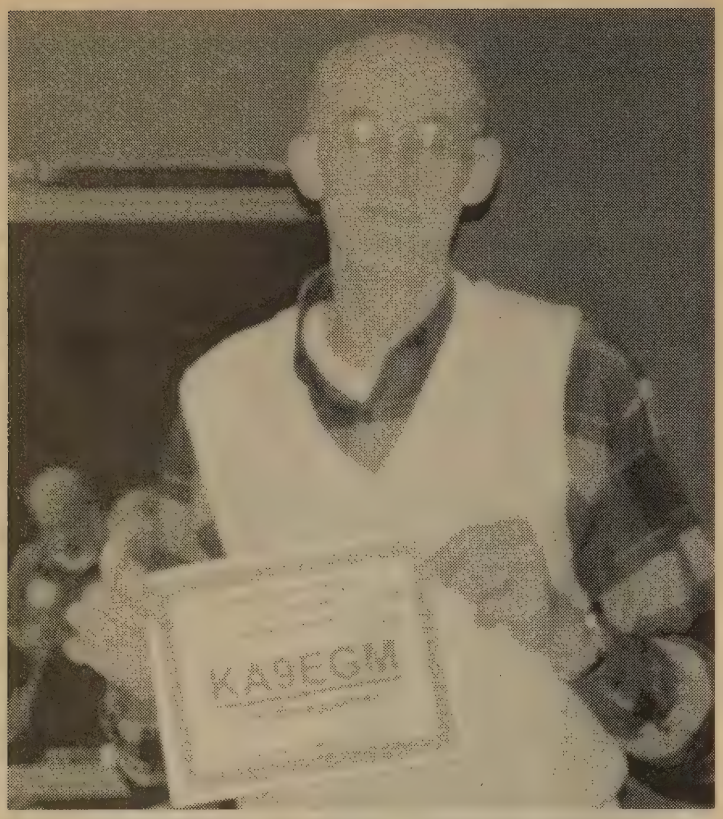
ATVQ

Reba Mathis, N9END, Kathy Millick, WB9QLY, & Shannon Hearst, KC9BIE

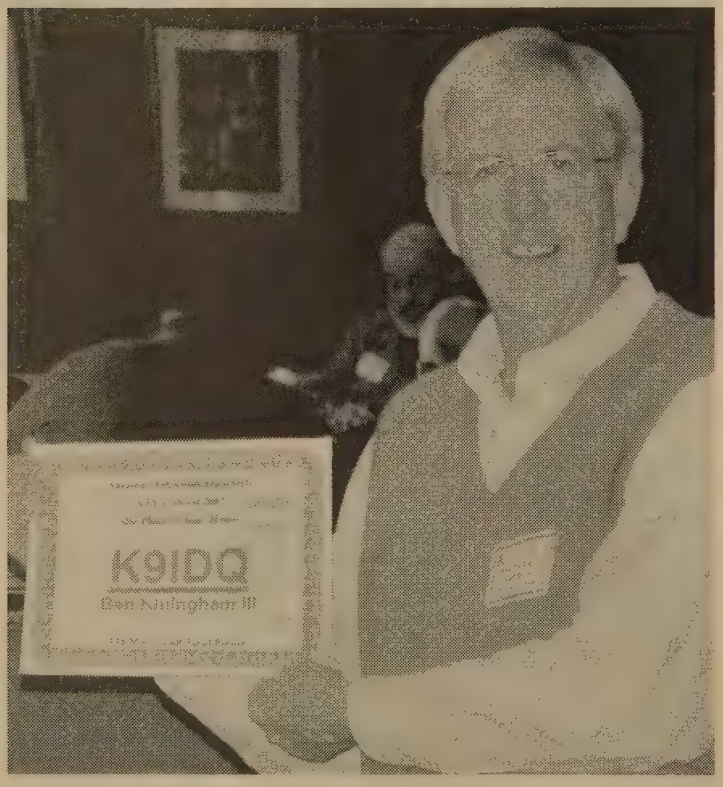
Shannon Hearst, KC9BIE
First Place ATV Contest - Mobile



K9SM - 3rd Place, N9XHU - 2nd Place
ATV Contest

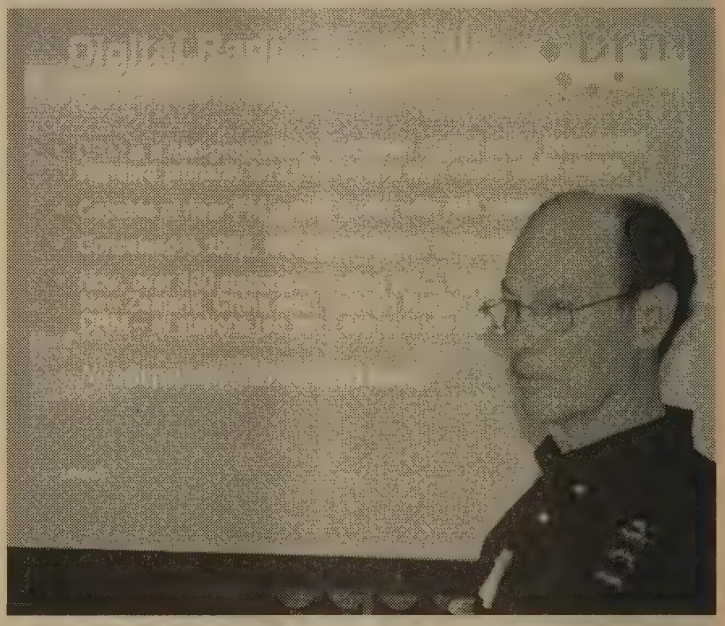


KA9EGM 6th Place - ATV Contest

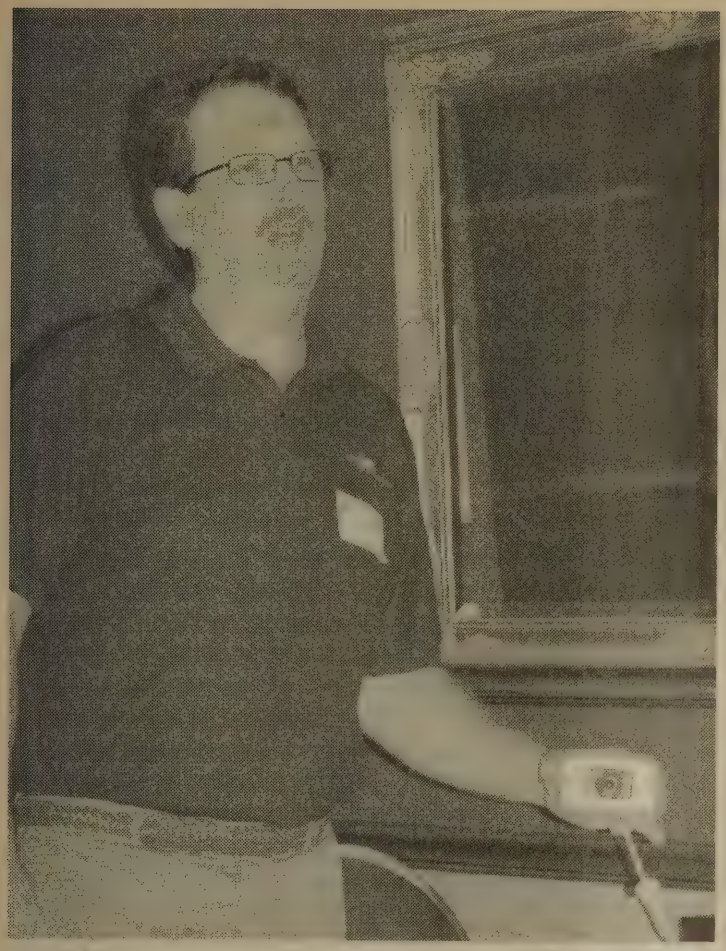


K9IDQ- 8th Place - ATV Contest

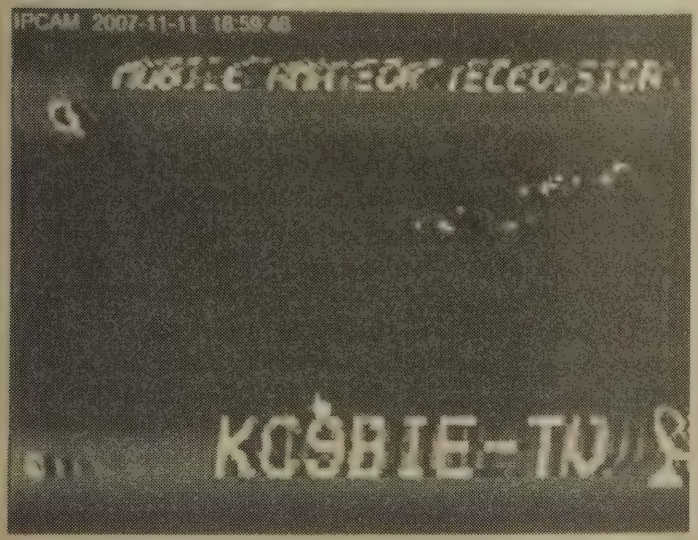
Glenn, WØDQY, gets 2007 Cental Illinois / St. Louis Area Amateur Television Operator Of The Year award.



Mel Whitten, KØPFX, speaking about Digital Voice Over HF



KA9UVY presentation on Internet Video Sites



Internet Video

Kathy Millick, WB9QLY, SK

We are very sorry to report that Kathy Millick, WB9QLY, from Litchfiled, Illinois passed away November 20, 2007. As reported by Scotty, K9SM, the graveside services were held Saturday, November 24, 2007 attended by family only with her dad and sisters and the dogs that we both love.

Shari and I had the opportunity to meet Kathy at the yearly banquet, and she was a delight to know. She will be missed.

ADD A 1.2 GHZ FM LINK TO YOUR AM OR FM ATV REPEATER

By: John B. Watson, NY3K Email: NYK2004@yahoo.com
8660 Felsview Dr.
Laurel, MD 20723

Introduction

Like most of you, I just love ATV and it is hard for me to fathom that for 25 of my 30 years as a ham, I never even considered getting into it. But a few years back I did, and now I find myself thinking every day of all the fun I am having and coming up with new ideas to enhance that enjoyment. My latest project was trying to solve the problem of some local ATVers not being able to see a distant ATV repeater, while at the same time interject FM ATV into our local ATV repeater. (I do not know if you have seen it, but FM ATV is truly distinctive with unbelievable clarity and depth of color.) My solution was to set up a linking station using FM ATV technology.

Now before I go on, I must say this. For you old hands at ATV, you may not find anything new in this article and it is because of you guys that I know enough now to write this. However, for those of you who, like me, are relative newcomers to ATV, I think this article might be of interest. So here goes.

Adding 1.2 GHZ FM Receive Capability to Your Repeater

Receiver

First of all, it makes no difference if you have an AM or FM ATV repeater that you will be linking to. The 1.2 FM link I describe here will work with both. Our local ATV repeater is AM with a 434 MHz input and a 421.25 MHz output.

Now, let's start with what link receiver to use at the repeater site. You have at least two paths here. One is to acquire new equipment and another is to acquire used equipment. Let's start with the new equipment.

I have found a wonderful little company on the Internet (on EBay) called MobiComm that makes a 1.2 GHz FM receiver circuit board (Model No. DFM1200RTIM) ($99.90) that works beautifully. (There are other companies out there on the Internet that advertise similar products. ***Editor: Harlan Technologies just started to carry a small quantity of these boards with our own firmware in the PIC chips.***) The MobiComm board is small and can be fit into a metal box with the connectors for antenna (SMA), video out (RCA), two audio out (RCA), and 13.7 volts power (standard barrel plug) projected through the front of the box. You likely will need an adapter cable to convert from SMA to N connector depending on your set up. The device has on-board dip switches which allow you to set up your receive frequency on any frequency available to us on this band in .5 MHz increments.

The second option for receiving a 1.2 GHz FM ATV signal is a used satellite receiver. I have tried a Blonder Tongue Model No. CESR-c (Stock No. 6166) ($50) as well as a Scientific Atlanta Model 9660 ($10). Both are readily available on the Internet (e.g. EBay) or from your local cable company as they convert from an analog to a digital format. And while these receivers were quite expensive new, they can be had for as little as $50 and under as they are sold as surplus equipment. Both these receivers give you a beautiful FM picture and high quality sound to output into your repeater controller. The Blonder Tongue receive frequency is set using push buttons on the front to dial up the frequency you want. The Scientific Atlanta has a little bit more involved set up, but it too uses push buttons to set the frequency. At our repeater in Laurel, MD, we use the Blonder Tongue, and at our repeater in Baltimore, we use the Scientific Atlanta.

Antenna

OK, now you have acquired your FM ATV receiver for your 1.2 GHz link. You now need to put up an antenna to receive the signal from your link transmitter (which we discuss below). You need to initially decide if you want to have an omnidirectional antenna or a beam. An omnidirectional antenna makes sense if you have others in your area who have, or will acquire, FM ATV transmitting equipment to feed into your link receiver. If so, I like the Comet GP 21 ($169) offered by PC Electronics (**www.hamtv.com**). Diamond also makes a good antenna that works on 1.2 as well. (Of course, these both are vertical antennas and I would recommend going vertical since there is less to choose from antennawise in the horizontal arena.) If you elect to use a beam at your repeater site, for point to point perfection, I would recommend the Directive Systems Model No. 2424LYRM Loop Yagi ($120) offered by PC Electronics. It is compact, has great gain (16.2 dB), and can be mounted with either vertical or horizontal polarity. This is what we use as our link receive antenna.

Preamp

If you go the satellite receiver route for your receiver, you will need a preamp at the antenna. Satellite receivers by themselves are pretty deaf. They rely on a low noise amplifier (LNA) or other device at the satellite dish that they were designed to work with. The LNA is powered by the satellite receiver which sends 19 volts up through the antenna feed line to the LNA. Therefore, you must use a preamp to get the best signal. I have found that

a wonderful German company, Kuhne Electronic (**www.db6nt.de**), makes just what we need. Kuhne sells a Super Low Noise Preamplifier Model No MKU LNA 132 A2 TM (162 Euros), which not only gives you a minimum of 35 dB gain with a 0.7 dB noise figure, it is even designed with a notch filter for 2350 MHz at input for duplex operation on 1.2 (RX) and 2.3 GHz (TX) for later expansion. The preamp utilizes for its power the 19 volts coming from the satellite receiver and comes in a waterproof housing with a female N connector for the antenna side, and a female F connector for the receiver side. Yes, I said F connector. The satellite receivers also have a female F connector for antenna input. This leads me to the next topic, antenna feed line.

Coax

If you decide to go with the MobiComm or similar receiver, you should get the best 50-ohm coaxial cable you can afford. Also, the shorter the cable length the better to avoid losses that are significant at 1.2 GHz and higher. I use 9913F7 cable which works fine, but you should get even lower loss 50-ohm cable if you can afford it. The ARRL Handbook has a very informative chart giving the various coaxial cable types and loss figures by frequency as a reference. If you decide to go the satellite receiver approach, you need 75-ohm cable, not 50 ohm. Given the preamp that you will use with your antenna provides a lot of gain, the loss issue is not that important here. But this does not mean such issue should be ignored. I use RG-11 cable which is 75 ohm and low loss and yes, since it is the size of RG-8 cable, you will need to buy the larger size male F connectors and the proper tool to mount them onto your cable.

Finding the Right Clear Frequency

Before you leave the repeater site, you need to decide the best frequency to use on 1.2 GHz. With the equipment I describe in this article, you can choose from scores of frequencies within our band. However, I learned the hard way that there are a variety of other RF signals out there that like to creep into the 1.2 GHz band, and especially on any one of our four usual ATV frequencies there (1252, 1255, 1265 and 1280 MHz). Therefore, you need to do a lot of listening and tuning before you make your final decision. Also keep in mind that, if you have elected to use the MobiComm transmitter, it is designed to emit a higher RF output near the top of our band than the bottom and this becomes important if you will be using a linear amplifier with your transmitter. (I use 1291 MHz as our 1.2 link frequency.) I write more about that below.

Deciding on Controller Priority for Your 1.2 GHz Receiver Input
At our local ATV repeater site, we use the Intuitive Circuits ATVC-4 Plus ($349) (PC Electronics) as our repeater controller. This wonderful device has five inputs for video/audio and tells the transmitter to transmit whenever it receives a video signal. If there are more than one such signals at the same time, it has a prioritization protocol where input #5 has the least priority and #1 has the highest. You will need to decide what priority to give your link signal. Should it take precedence over all other incoming signals, should it have the least priority, or should it be somewhere in the middle? This will depend in part on what exactly you intend to send over the link. If you are linking in a distant repeater, do you really want that signal to override a signal coming from someone accessing the local repeater directly? If your link is used to give a boost to distant stations who access the local repeater on its normal input frequency, it may also pick up locals on that frequency who have a better signal into the repeater direct than through the link. You don't want your link to degrade their signals. Bottom line, give a lot of thought to this issue. The safest path may be to give the link signal the least priority, but that may not always be the best path (e.g. when a distant station needs that extra boost to get a solid picture into the repeater although he does have a minimal picture direct, you are stuck with the minimal picture).

Adding 1.2 GHZ FM Transmit Capability to Your Home Station

Transmitter

As noted above, the MobiComm Company makes a great 1.2 GHz receiver. It also makes a couple of 1.2 GHz FM transmitter boards (Model Nos. DFM1200TSIM (50 mw) ($89.90) and DFM1200TSIM1W (1 watt)($149.90)) that match perfectly with their own receivers as well as with the satellite receivers I discussed. I use the 50-mw transmitter as an exciter for a Down East Microwave linear amplifier (see below). The board is small, compact, and like the MobiComm receiver board, can be neatly mounted into a metal box with its connectors for antenna (SMA), video in (RCA), audio in (two RCA), and 13.7 volts power (standard barrel plug) projected through the front of the box. The transmitter board has one adjustable pot on the board that can be used to adjust the intensity of the color. The board also has a set of dip switches so that you can set the transmit frequency on any frequency in our band in .25 MHz increments. The transmitter is rated at 50-70 mw, but I have found that its output is lowest at the lower frequencies (e.g. 1250 MHz) and highest at the top of our band (e.g. 1291 MHz). I have not tried the 1-watt version noted above, but suspect it will work just fine.

There are other manufacturers of 1.2 GHz FM transmitters, but I can only speak regarding the ones I know. The Videolynx corporation makes a very neat 1.2 FM transmitter (Model Z23B)($349)(PC Electronics) that is rated at 2 watts output and comes with dip switches for programming one of the four standard ATV frequencies for 1.2 GHz. I own the Z23B and have found that it works well. However, I have talked with Ravi, the owner of the company, and he has advised me that he can no longer get power modules for the transmitter so its availability may be problematic, although I continue to see it advertised in this publication. Keep tuned in, though, since Ravi is always developing new ideas and products and I would bet we will see another 1.2 GHz transmitter on the scene before much longer.

Linear Amplifier

While I can reach my local repeater with 2 watts on 1.2 GHz using the Z23B, I opted for setting up my link station with a little more power to overcome any future interference that might arise. Therefore, I purchased a Down East Microwave linear amplifier, Model No. 2330 PATV ($240). It is rated at 30 watts output for 50 mw in and can handle up to 100 mw input. It was a perfect match for my MobiComm transmitter and working together, they provide me with a very reliable 23 watts output at 1291 MHz. I use an adapter that has an SMA male on one end and an N male on the other end and plug the MobiComm transmitter directly into the linear without the need for coax. No losses there!

Antenna

For your link station, you should use a good quality beam antenna at home. I use the Directive Systems 2424LYRM loop yagi discussed above. I do not use a rotor for this beam since it is pointed at the ATV repeater all the time. Perhaps, in the future, when others in this area discover the beauty of FM ATV on 1.2 GHz and decide to acquire their own similar equipment, I may need to use a rotator to have some additional fun. But for now, my antenna is dedicated to the link and always points at the local repeater where the 1.2 GHz receiving equipment is located.

Coax

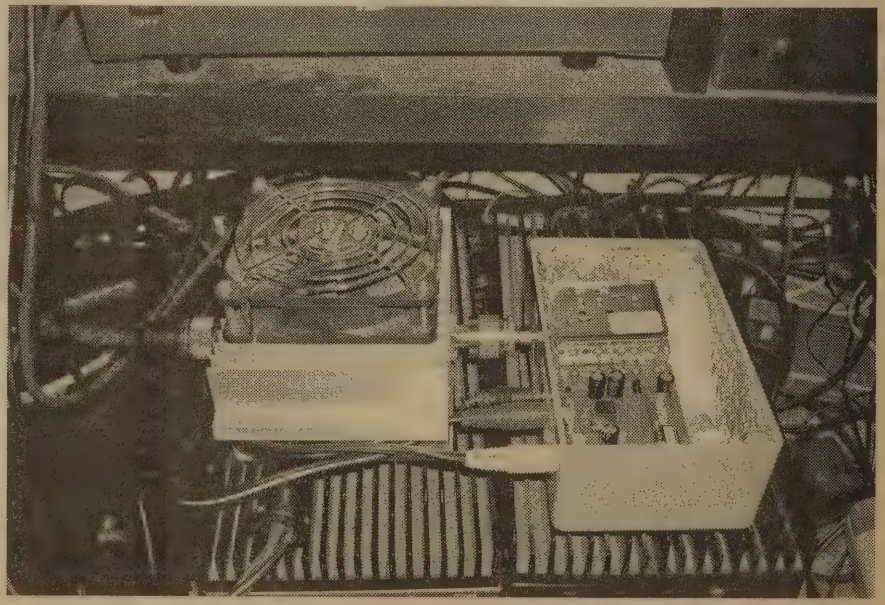
I use 9913F7 coax here at home between my loop yagi and my linear amplifier. The run is about 50 feet. The yagi is up about 20 feet off the ground using two 10 sections of heavy duty TV masting connected together and mounted on the side of the house.

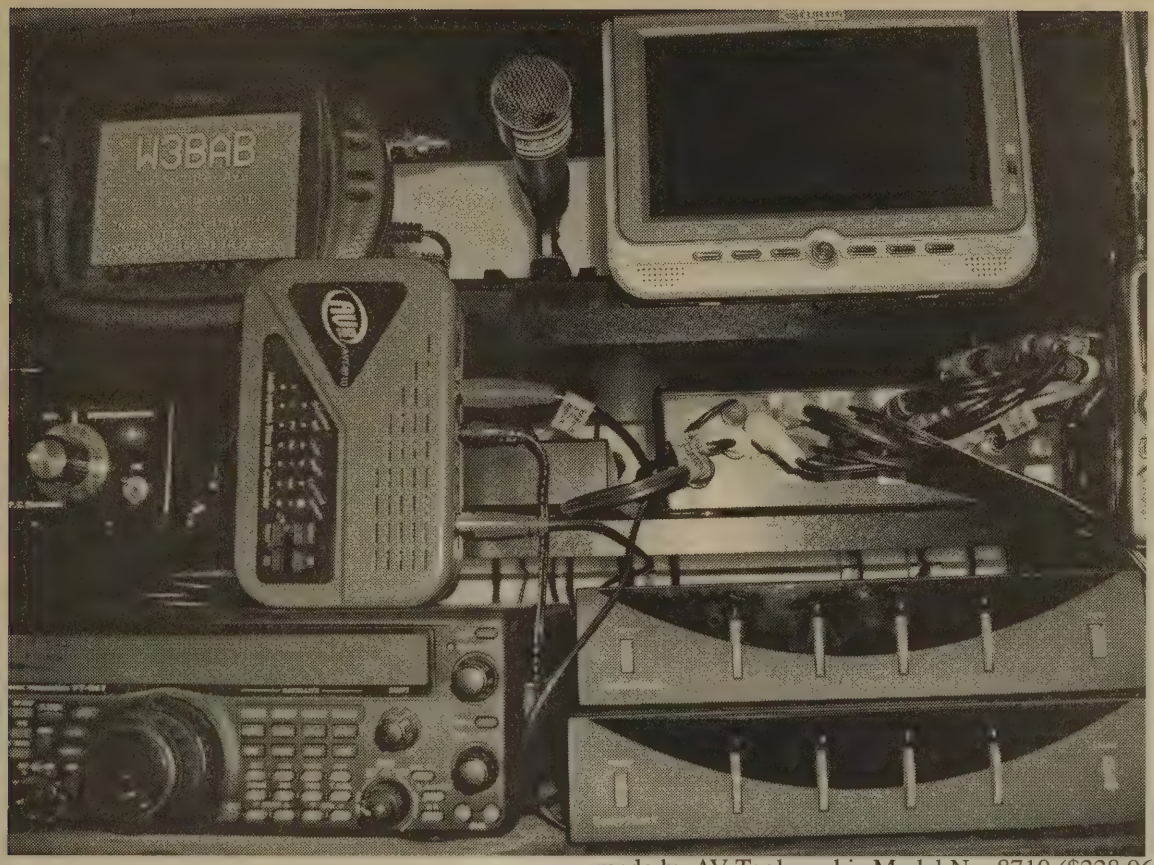
Bells and Whistles

The first thing I did when I got my link station set up was to transmit my own video over the link so that for the first time, I could see myself coming back on the repeater. I could not do this without the link because my own transmit signal on 434 MHz into the repeater wiped out the repeater's output signal (421.25 MHz) here in the shack. Seeing my own signal coming back into the shack also allowed me to adjust real time the color intensity setting on my MobiComm transmitter. However, as I allude to above, there were other ideas floating around in my head. Several of the local ATVers could not see the Baltimore ATV repeater which is some 21+ miles away, but due to my antenna system and height above sea level, I could. I wanted to see if I could use the link to get that distant repeater into our local repeater. So too, some of the guys up in the Baltimore area were not able to get a decent signal into our local ATV repeater. I could see them very well on simplex, but they just were not making the grade at the local repeater. Could I use the link to give them an extra boost? Finally, while I might be able to accomplish these tasks by sitting at the radio control desk 24/7 and switching video cables into and out of the MobiComm transmitter, was there a way to do this automatically? The answer was yes.

Repeater Controller

Based on my experience with the Intuitive Circuits ATVC-4 Plus controller, the answer came to me—set up a repeater controller here in the shack to feed into the MobiComm link transmitter. That way, I could use my separate receivers/down converters and antennas and any time the distant repeater came up, or a distant station I could see which needed a boost to get into the local repeater came on, the controller here in the shack would do the work. It would sense the video, remember its priorities, and then send a signal to the MobiComm transmitter to send over the link to the local ATV repeater. I did not have to sit in front of the ATV





monitor 24/7 after all, although the thought of that is not all negative.

OK, use a controller to do the work. Great idea. But how do you turn the transmitting equipment on and off? I mean if you ran the MobiComm board in transmit 24/7 as well as the Down East linear, the equipment would surely not last very long and might well play havoc on the local repeater end with an always on transmitter feeding into it. Well the solution was, again, simple. Intuitive Circuits has a built in circuit in its controller board that goes to ground when a video signal is sensed. PC Electronics calls it a PTL or Push-To-Look function. I used this function in conjunction with a simple 12-volt relay to key the transmitter when video is sensed by the controller. That is, the two connections to the PTL circuit of the controller were attached in line with the negative side of the power to the transmitter through the relay. That way when the controller sensed video it brought the PTL circuit to ground keying the relay and completing the negative side of the transmitter power which caused the transmitter to come on and transmit. When the video signal was lost, the PTL circuit opened and the relay turned the transmitter off. As for the linear amplifier, it can always be powered on since it does not actually amplify until an RF signal is sensed and that will only be when the PTL circuit goes to ground.

Time Base Corrector

I have recently learned of a solution to pictures that seem to roll as they come out on the repeater after the link sends the video over. The answer is a device called a Time Base Corrector / Frame Synchronizer. The one I purchased on the Internet is made by AV Tools and is Model No. 8710 ($228.96)(Markertech Video). What it does is really magic! In actuality, it takes the video signal fed from the controller just before it goes to the transmitter, and reconstructs each video frame, and then sends it to the transmitter. It has almost eliminated the rolling I was experiencing on weaker signals as they were sent out from the repeater and greatly improved, and in some cases actually provided completely, the color of the video being sent out. It is a wonderful device and I have come to believe a very necessary component for any link station that you might set up.

Conclusion

I have to stop writing here. I am getting carried away and unfortunately for you all who have made it this far, there is no time out timer to give you a break. I just might add that there are some other ideas floating around in my mind regarding this link station of mine that I might address in another article if warranted. Such things as remote DTMF tone control of the various functions of the repeater controller (yup, it is built in), adding a video board to the link controller to make a nifty ID screen, utilizing a quad video processor so that more than one video picture at a time can be seen on the link screen, etc. start to come to mind.

Thanks for making your way through the above with me. If you have any questions as to what I did, or would like more information, send me an email at NY3K2004@yahoo.com and I will see if I can help out. Good luck to you all in this wonderful aspect of our hobby.

ATVQ

For Sale - Want Ads

Send in your items!

Here is a list of equipment I am selling. Everything is in good condition, guaranteed to work, and marked 50% off the retail price. UPS shipping charges will be added. All equipment must be purchased by licensed amateur radio operators. The reason for the sale is our repeater has had no activity in years and I am finishing our basement so I had to clean it out.

Please email me at chris@icircuits.com if you have questions or would like to make a purchase.

Thanks!

- Chris (chris@icircuit.com)

ATV Equipment
1 P.C. Electronics ATV Repeater Receiver ATVR-4 (434.00 and 439.25) [$149.00]
1 P.C. Electronics ATV Repeater Receiver ATVR-4 (439.25 LSB) [$149.00]
1 P.C. Electronics ATV Repeater Transmitter RTX-23 (1253.25) [$164.00]
1 P.C. Electronics ATV Crystal Downconverter TVCX-23 N (1253.25) [$55.00]
1 P.C. Electronics ATV Crystal Downconverter TVCX-23 BNC (1253.25) [$55.00]
1 Down East Microwave 1.2 GHz 35 watt AMP 2340 PAHS [$make offer]
1 Down East Microwave 23cm weatherproof LNA 23LNA [$60.00]
1 Gekco Labs Video Pattern Generator VG10 [$319.00]
2 Kenwood VC-H1 Visual Communicator [$make offer]
2 Elktronics boards [$make offer]
2 Pico VHF/UHF rack mount video/audio demodulator 54 MHz to 806 MHz PFAD 900 [$make offer]
3 Pico video/audio modulator cable TV 65 to 131 CAM-35U/U [$make offer]
2 Superscope digital quad splitter b/w rackmount VMS550mkII [$make offer]

Filters
2 International Crystal Manufacturing (ICM) FL407 434.000 VSB Filter (tuned for 439.25 LSB) [$make offer]
1 Digital Communications, Inc. (DCI) 6 MHz Bandpass Filter (tuned for 1255.00 MHz) 8 pole [$185.00]
2 Digital Communications, Inc. (DCI) 440-450 MHz Bandpass Filter DCI-445-10C 4 pole [$95.00]
2 Digital Communications, Inc. (DCI) 2 Meter Bandpass Filter DCI-146-4H 4 pole [$85.00]

Antennas
1 Comet GP-20 1.2 GHz 14.9 dBi omni antenna (new) [$make offer]
1 Diamond U-300 440/1200 8.6 dB/13.2 dB omni antenna [$make offer]
1 Comet CYA-1216E 1.2 GHz 16.6 dBi beam antenna (new) [$80.00]

Radios
Kenwood TM-441A [$175.00]

Miscellaneous
MFJ TNC MFJ-1274 [$make offer]
Kantronics Packet Communicator 9612 Plus [$make offer]
Mountain View Communications Technology GOES Weather Satellite Downconverter 1691-A [$make offer]
Hamtronics NOAA Weather Satellite Receiver [$make offer]
MultiFAX Weather Satellite PC card [$make offer]
Kansas City Tracker PC card [$make offer]

ATVQ

James M. Paul - N9LKY - SK

James M. Paul, 56, of West Baraboo, formerly of Berlin, died unexpectedly on Monday evening Dec. 17, 2007, at his home.

Jim was born on May 4, 1951, in Rapid City, S.D., the son of James M. and Yvonne (La Mue) Paul.

He is a graduate of the Berlin High School Class of 1969 and then graduated from Michigan Tech of Houghton, Mich., with a degree in electrical engineering and went on to receive his master's degree from the University of Wisconsin-Madison.

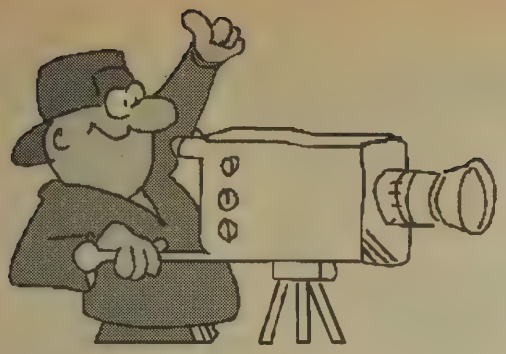
Jim was self-employed as an electrical engineer and contracted himself to several different firms in the Baraboo and Merrimac area and recently retired.

He is a member of the Sigma Phi Epsilon Fraternity. He loved the area that he lived in, where he was able to pursue his hobbies of fishing, golfing, and hiking and was also very active in weather balloon tracking.

He is survived by his mother, Yvonne Sage of Berlin, his sister, Judy M. Paul of Minneapolis, Minn.; also two stepbrothers, James (Maureen) Sage of Sioux Falls, S.D., and Richard Sage of Berlin; also two stepsisters, Susie (Dave) Trampf and Kathy (Kurt) Baxter, both of Berlin; also his best friend since childhood, Bill Clasen of Merrimac; and Jim's godchild, Chelsea Clasen; also other relatives and friends.

Funeral services were held on Friday, Dec. 21, 2007

Editors Note:
I will miss Jim's smiling face at the Madison Wisconsin hamfest. Enjoyed a couple of balloon flights with him also.



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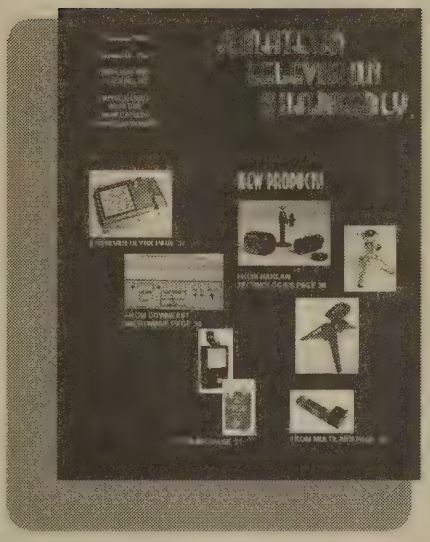

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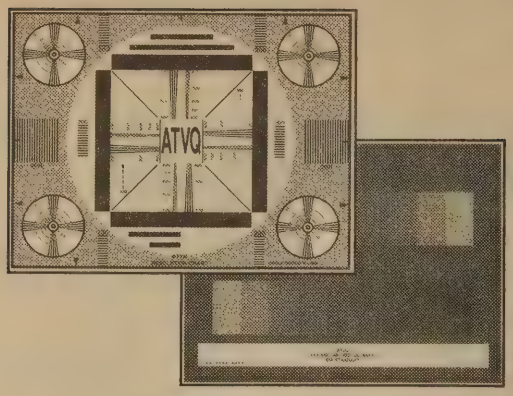

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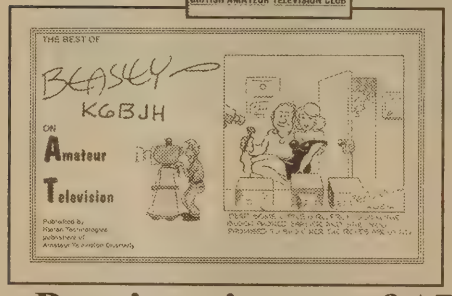

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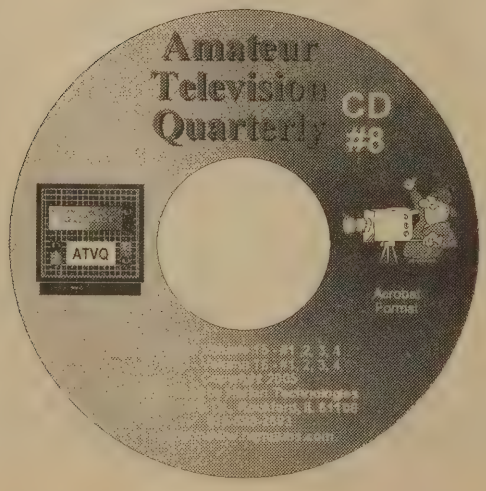

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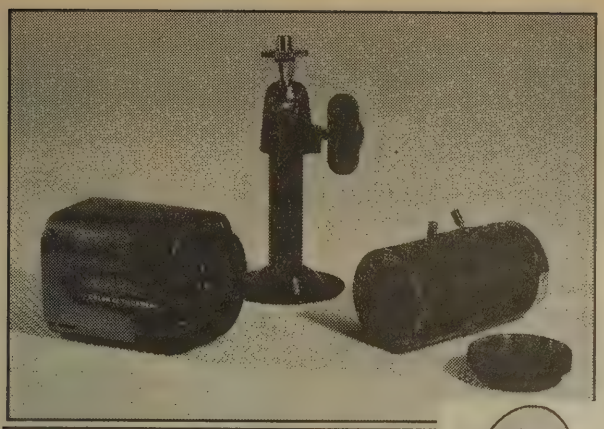

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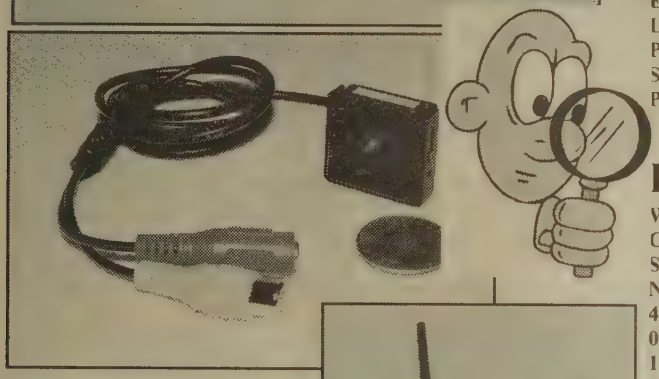

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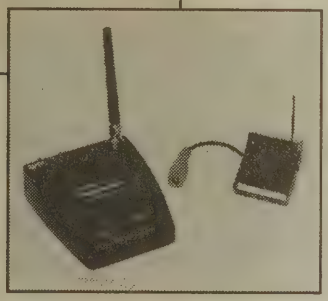

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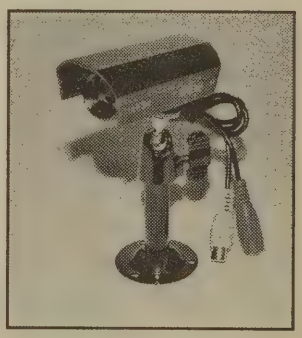

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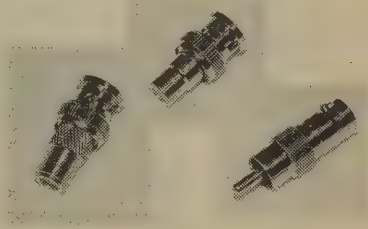

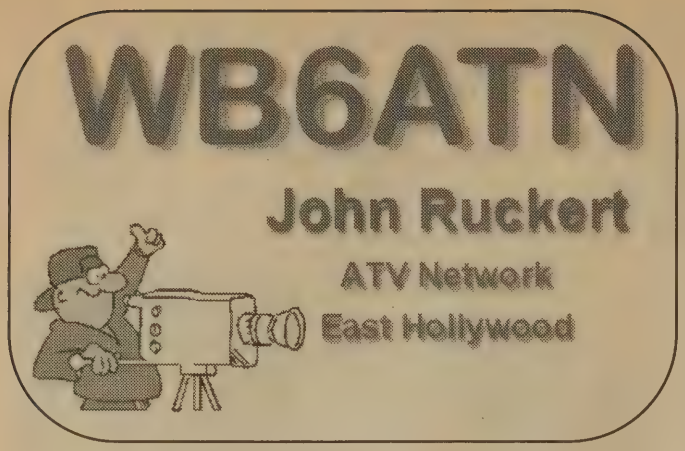

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Attending the Great Plains Super Launch 2007 with an Accelerometer and a Bag of Potato Chips

By Paul Verhage - KD4STH Email: Paul.Verhage@boiseschools.org
5720 3rd Ave.
Nampa, ID 83686

Three days after my first launch of the year (see ATV Quarterly, Fall 2007), my girl friend, Rachel*, and I headed to the Nebraska for the Great Plains Super Launch (GPSL) 2007. This would be Rachel's first road trip to the Midwest and her first near space launch.

Rachel has heard a lot of my near space stories. She's very supportive of this unusual hobby, even though she doesn't program microcontrollers or have a ham license (I'm working on these issues). Our trip to Grand Island, Nebraska took nearly a week on account of old college (Kansas State) and family visits. We finally arrived at Grand Island on July 5th. Roger Hammond (KC0MWM) and his group, the Central Nebraska Near Space Program (CNNSP), hosted GPSL 2007 and did a really great job.

While some of the early arrivals met Thursday night for a pre-GPSL get-together dinner, the real event didn't begin until Friday morning. Groups from Maine to Idaho to Alabama gave presentations on their near space programs and technology at the Howard Johnson Riverside Inn, Grand Island.

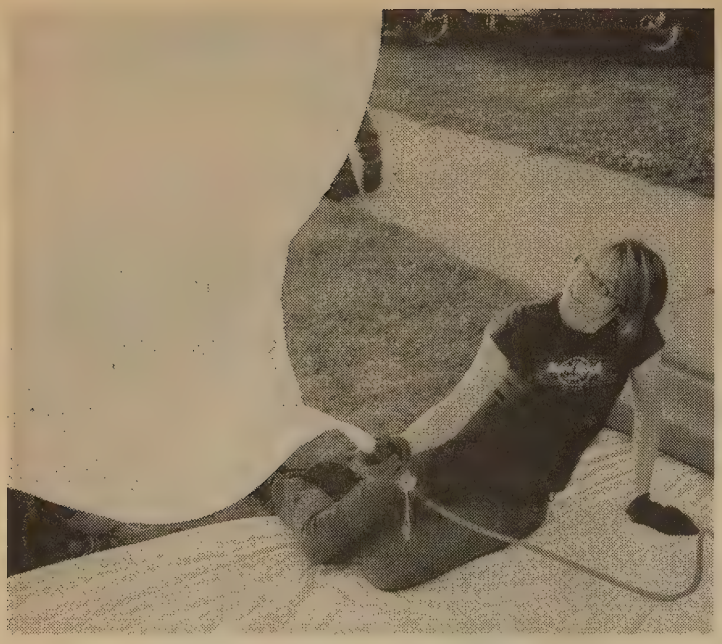
The Edge of Space Sciences (EOSS) from Denver Colorado explained some of the physics behind a balloon's change in vertical velocity. We learned that as far as a floating balloon is concerned, the air behaves like a flowing liquid. Therefore, when the balloon slows down, the air around it must be slowing down too. However, since the air doesn't compress significantly, the air's change in horizontal movement becomes vertical. Sure enough, EOSS was able to demonstrate that variations in a balloon's ascent rate correspond with variations in its horizontal velocity.

Mark Conner (N9XTN) of Nebraska Stratospheric Amateur Radio (NSTAR) gave a presentation on the meteorology of balloon flights. Mark is a meteorologist by profession and very knowledgeable about this topic. If you want to become acquainted with meteorology, then Mark's presentations at GPSL are not one to miss.

I presented on the OnSet Computing G-Force logger, the Pendant G. Some readers may be familiar with OnSet Computing's other line of data loggers, the Hobos (check out their website, **www.onsetcomp.com**, for information on their extensive line of data loggers). At the end of this article is a short report on my near space Pendant G results.

The Launch

Saturday's launch took place in Doniphan, a suburb of Grand Island. There was a slight breeze that morning, but the trees on the south side of the rifle range did a great job blocking most of it. However, just to be on the safe side, I quickly filled and launched the NearSys balloon. This was Rachel's first launch. As you can see below, she enjoyed helping out.



During the launch, I visited with other groups getting ready for flight.

Mark Conner (N9XTN) filling the NSTAR balloon.

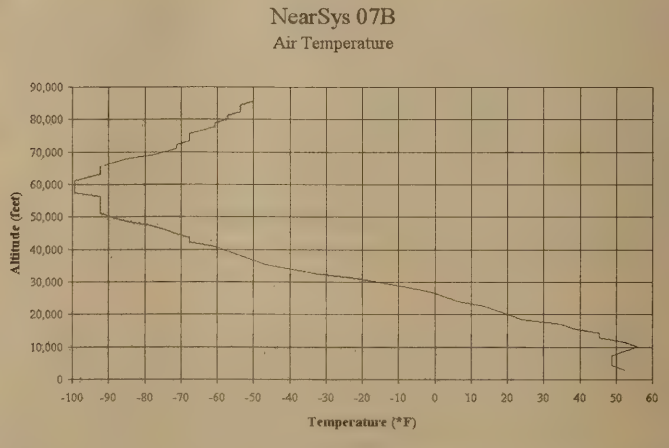
The Maine group (EOSRED) assembled their stack a bit differently. Their parachute hangs down below at the bottom of their near spacecraft. Its Mylar parachute blowing in the breeze gave their near spacecraft a living appearance.

The Chase

Since I don't normally bring tracking equipment, I caravanned with the NSTAR after the launch of both of our near spacecraft. Since I launched first, the NearSys flight was the first mission we chased. The NearSys flight carried a Geiger counter, a set of LED photometers, accelerometer, miniature weather station, video and still cameras, along with a dual redundant APRS tracking system. The mission reached an altitude of 87,455 feet, according to the last recorded APRS position.

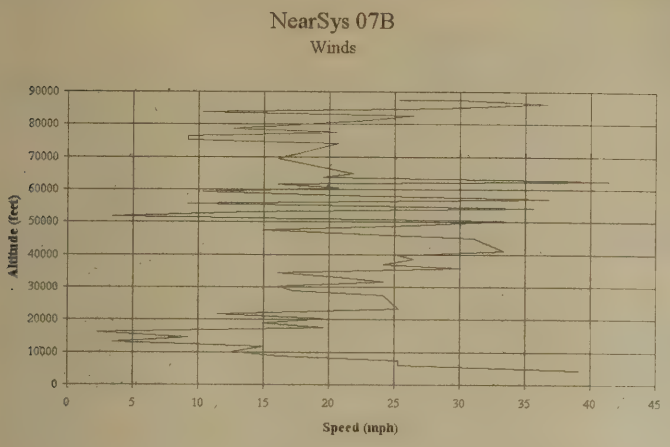
Here's Mike Manes (W5VSI) busy at work. Mike is one of the founders of Edge of Space Science out of Denver, Colorado. EOSS is probably the oldest functioning amateur radio high altitude ballooning groups.

The air temperature recorded on this mission was a bit unusual in two ways. First, the coldest temperature occurred at 60,000 feet, rather than a more traditional 50,000 feet. Second, the coldest temperature was -100 degrees, far colder than I've ever seen in a near space flight. Perhaps there's a calibration error in the thermistor data. If so, to prevent this in future flights, I'll substitute a LM335 temperature sensor for the thermistor in 2008.

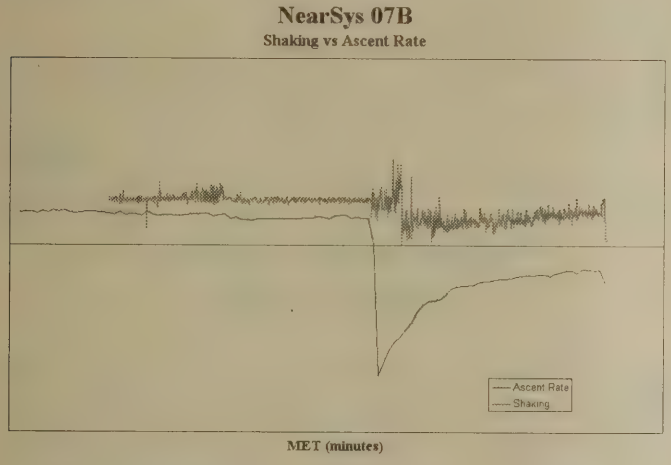


The most normal part of this temperature profile is the temperature inversion at 10,000 feet.

The winds aloft were typical for flights in the interior of a high pressure system. The winds are weak and show no sign of a high speed jet stream at altitude (usually 40,000 feet).



Now here's the Pendant G data I promised.

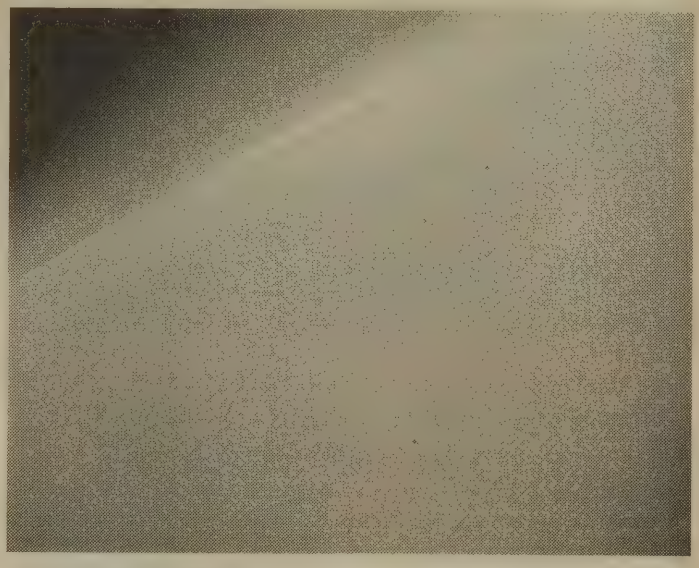


The changing accelerations or shaking that my near spacecraft experienced during its flight compared to its vertical climb rate. Since I didn't account for the time zone change when I programmed the accelerometer for its mission, there's a gap in the data at the beginning of the flight.

The first half of the balloon's ascent experienced a slightly higher climb rate (around 200 feet per minute greater) than the last half of the ascent. In the chart, the more rapid climb rate corresponds with the increased shaking. The higher climb rate is probably rougher on the balloon due to the more turbulent air flow it causes.

An increase in the balloon's drag probably causes the balloon's ascent rate to drop half way through the flight. What causes the balloon's drag to increase at high altitude? Possibly, it's due to a change in the balloon's Reynolds Number. When the balloon has ascended high enough, the reduction in atmospheric pressure results in a change in the ratio between the balloon's size, air pressure, and ascent speed (all factors contributing to the balloon's Reynolds Number).

The atmosphere was a bit hazy over Nebraska, as you can see in the photograph taken at peak altitude. At this altitude, the horizon is around 360 miles away. The haze is so thick that it obscures details on the horizon. At the bottom of the image, the Platte River and a portion of Grand Island are faintly visible.

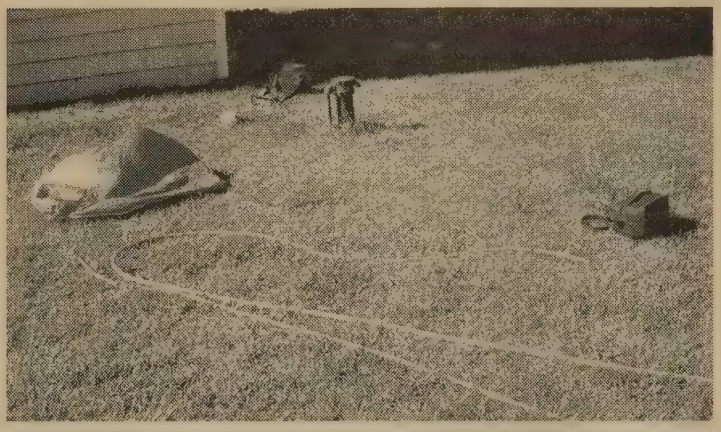


NearSys flight 07B recovered in a soybean field. Both on-board video and still imagery recorded that touchdown in the field. When you get a chance, catch the video of the landing at my website, NearSys.org, under Amateur Radio High Altitude Ballooning, Data from Past Flights, 2007, NearSys 07B.

Seconds before landing, the on-board digital camera recorded this last image of the descent.

After recovering the NearSys flight, we hotly pursued the NSTAR flight. Mark's mission had reached an altitude of 110,915 on its 2,000 gram balloon and was now on its way down. We were close enough to see the near spacecraft

descend next to a farm house. However, the trees in the yard blocked our view of the final touchdown. The home-owner was working in her yard when the NSTAR flight arrived in the yard. She was quite friendly and eventually became interested in the event.



The NSTAR near spacecraft as it landed. It would be nearly impossible to land any closer to this house without landing on its roof.

I want to wrap up this article with the remaining payload carried on the NearSys flight. Suspended at the bottom of the NearSys stack was a bag of potato chips. Its top seam was sealed and strengthen with a duct tape and a wooden dowel. That left the bottom seam the weakest one and ensured it would be the one to split open during the flight. Past flights have show that a bag of potato chips splits at around 16,000 feet. At 16,000 feet, the atmospheric pressure is just over half of what it is at launch. With an average pressure of 14.7 PSI at sea level, the air pressure exerted on the bag is somewhere around 7 PSI when it splits open. Now it will be a little less than this, as potato chip bags are not fully filled with air when they're sealed. However, let's assume 7 PSI for this calculation. The bag of chips on NearSys 07B measured 8 inches by 10 inches as I recall. The bag was basically flat, so the surface area on the bag is 8 inches times 10 inches per side, or 80 square inches. That makes the total surface area of the bag, 160 square inches. With a pressure difference between the inside and outside of the bag of 7 PSI, there's a total force of about 1,120 pounds on the plastic bag when its bottom seam finally splits open. Half a ton of force; that's not bad for a bag of chips.

Next year's GPSL takes place from July 31st to August 3rd and is hosted by Near Space Ventures in Kansas City, Missouri. If you'd like to be a part of amateur near space exploration, then GPSL is the place to be. Check out **www.superlaunch.org** for details on GPSL 2008.

Onwards and Upwards,
Your Near Space Guide

Post Script

I'd like to thank this year's GPSL sponsors; Argent Data Systems, ATV Quarterly Magazine, Byonics, CQ VHF Magazine, Linweld, Nuts & Volts Magazine, OnSet Computing, and Parallax. Because of their sponsorships, GPSL 2007 was a great success.

Post, Post Script

Some of the other groups attending GPSL this year were; BASE (Balloon Assisted Stratospheric Experiments) out of DePauw University, ORB (Oklahoma Research Balloons) out of Oklahoma, Bill Brown (WB8ELK) visiting from Alabama, Taylor University out of Indiana, and NSV (Near Space Ventures, Inc.) out of Kansas City.

Here's a list of websites for the GPSL 2007 attendees.
Reach for Space
EOSRED
K0NMS
BUNS
http://www.cnnsp.org.
http://www.depauw.edu/acad/physics/base/pages/links.asp
http://members.cox.net/hhm_74775/orb/
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http://nearspaceventures.com
http:// www.nstar.org.
http://nearsys.org

ATVQ

* Rachel and I were engaged on December 28, 2007.

Fellow ATCO ATVers, NEWS FLASH

The 147.45 ATV simplex talk frequency was changed to 147.48 MHz this afternoon. We decided to change the frequency some time ago and have been talking about it for a few years now. It seems that 147.45 has an increased amount of interference on it from both intentional as well an unintentional radiators. For example, a number of cable systems seem to radiate on 147.45 in some neighborhoods as well as a number of computers, mine included. Therefore an alternate frequency has been sought that is much "quieter". I believe that 147.48 is the best input. The 446.350 link output remains unchanged

We do not plan to make it switchable between 147.45 and 147.48 so the decision to go "cold turkey" was selected. Please look for us on 147.48 from now on. As a plus, I find that the 147.48 filtering requirements downtown are less so a single cavity filter seems adequate to keep 146.76 from desensing our 147.48 input. That's about 2 dB less filter loss so the input should be a little more sensitive. Check it out and let us know. If any of you notice interference on the new frequency we would all like to know so we can take corrective action.

That's all for now. Remember, try and join us on the new 147.48 frequency this Tuesday at 9 PM for our regular NET night roundtable. "See" you then.

Art Towslee
WA8RMC

Make Your Own PC Boards - Easy!
What? Easy?

By: Gene Harlan, WB9MMM Email: ATVQ@hampubs.com
5931 Alma Dr.
Rockford, IL 61108

I know the title just does not sound right, and you do to if you have ever made PC boards before. In the past when I made boards, I had to coat the boards with resist, let them dry (in a dark place), sandwich a negative on top of the board and expose to UV light for a while, then remove the resist that was not supposed to be there, and again let it dry. Finally I was able to etch the board, and because it was so slow, I had come up with many methods of making it go faster. I tried rocking a tray (made a motorized one), heating the Ferric Chloride, and I am sure other things to try and speed the process up.

Making the negatives was OK, but still took lots of time. In a past life I had a very strong interest in photography, to the point that I went to Brooks Institute of Photography when I graduated from high school. When I was making printed circuit boards, I even bough an Eastman Kodak 8x10 view camera so I could make large negatives. Boy, the time spent to make one circuit board ended up being hours. But I did it, as it was fun and that was the only way to get the neat projects done.

15 minutes!

What if I told you that a circuit board could be made in 15 minutes? I would not believe you if you told me, so why would I expect you to believe me. Just because I am a nice guy? Well, it can be done.

I have seen on the Internet, different web sites showing how to make a circuit board using photo quality paper in a laser printer. I wondered if that would really work. Then I found Pulsar Professional fx at **http://www.pulsarprofx.com/** . What I read sounded too good to be true, but nevertheless, I would go back to that site from time to time, re-reading what they claimed. OK, it was time to buy the product and see for myself.

While I ended up buying the whole kit that they sold, not just for PC boards but for making decals as well. The decal part will have to wait, maybe another article.

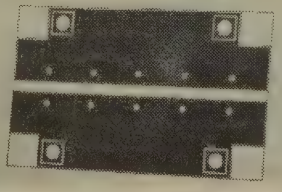
To me, it is important that you get the laminator that they sell. I can not tell you that another laminator won't work, but I can tell you that theirs does. Well, after you learn a couple of things it does.

OK, first you need some artwork; therefore it helps to have a project. I am a lover of Anderson Powerpole connectors, as many of you are. Therefore, I also like the distribution strips to take the power from the power supply and allows you to plug many things in. The first project was to be a distribution panel with one power in and four power out connectors. I did not include fuses, which would be super, but I needed a project that I could get done in the amount of time that would allow me to publish this article in the Winter 08 ATVQ. So, I will include a fuse in the incoming power wire.

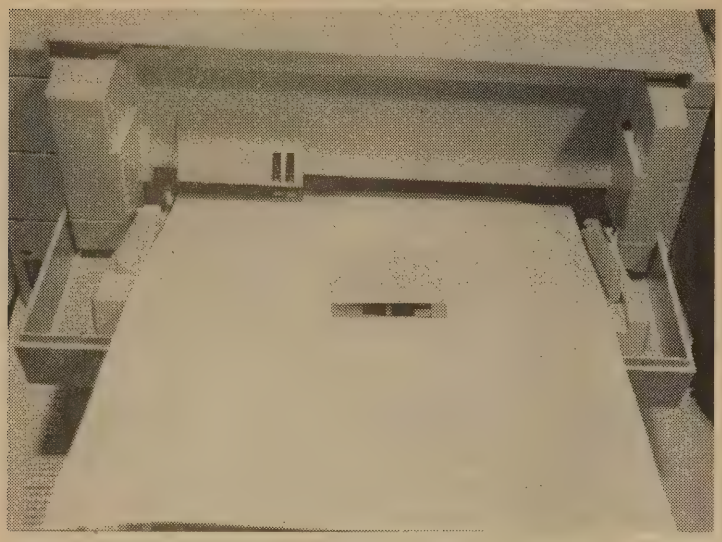
I did the artwork in a package that we use at work, but there are many different packages out there, some free. The artwork is in photo #1. The outside dimensions are 1 1/2" x 2 1/2".

Print the artwork out on a plain sheet of white paper. Adjust the image (my program allowed moving it around) so it is out in the middle of the paper. What we are doing is a method that is described on the Pulsar web page so you do not have to use a full sheet of the TTS paper each time. The TTS paper is part of the big secret of why it is so easy to make a board. While it is not terribly expensive, I try to save money whenever I can.

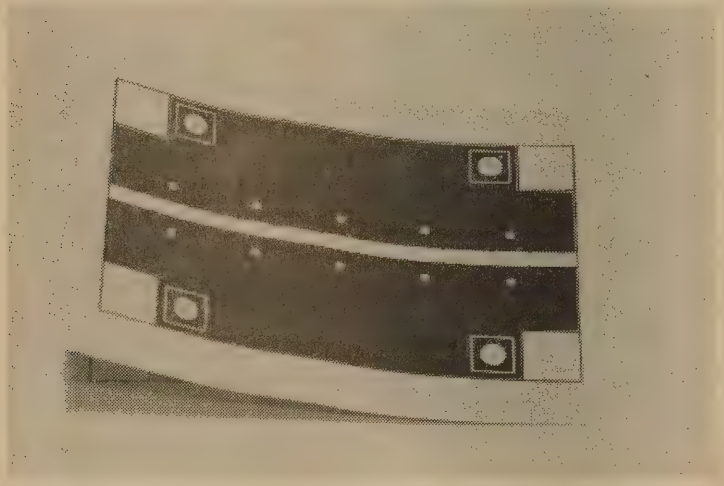
So, now that you have the image in the middle of a sheet of paper, we will cut out a piece of TTS paper just a little larger than the artwork.



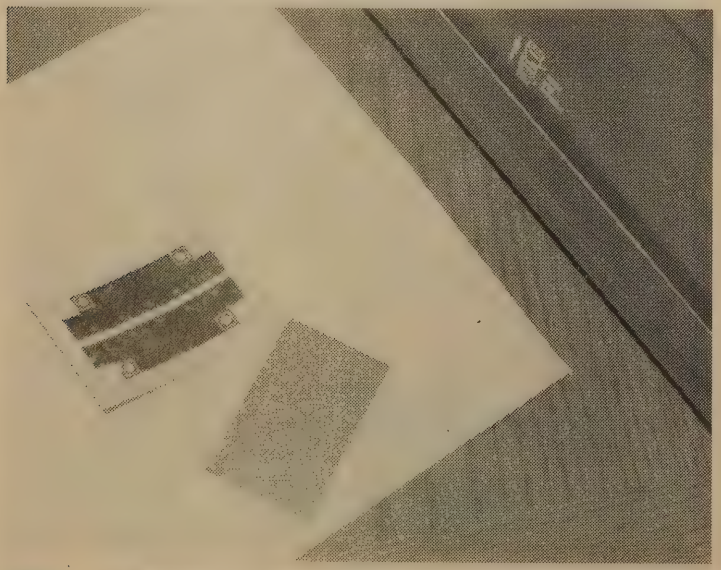
Now, we take the TTS paper, and place it shinny side up, right over the image that you printed. Align it so that the bottom edge (the edge that goes through the printer first) can be held in place with an Avery label.



After printing, it looks like the photo below.



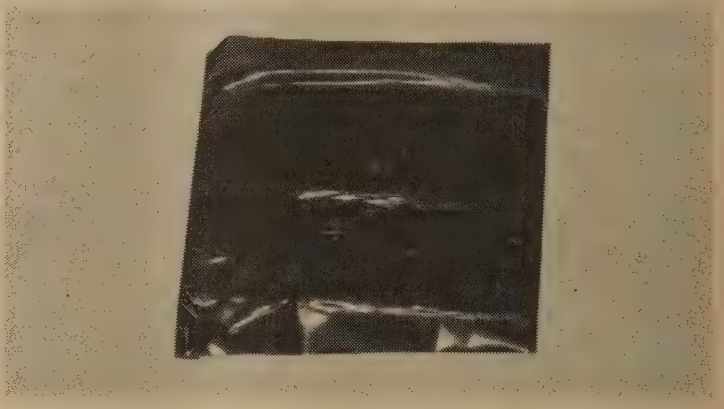
Now you will get ready for the laminator. You want to make sure that the PC board is clean. A ScotchBrite scrubbing pad and a drop of dishwashing soap works well.



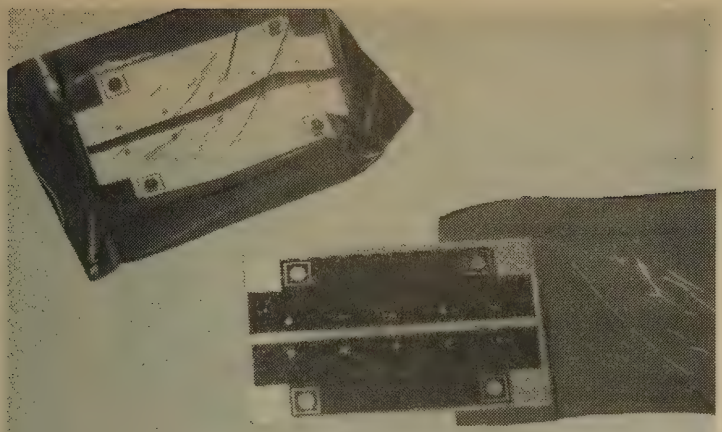
Feed the sandwich of PC board and TTS paper, with the image down towards the copper surface, through the laminator. When I did this the first time, the TTS paper did not stick. I learned that you need to let the laminator heat up for about 30 minutes, and pass the sandwich through two or three times. Only pull up lightly to make sure that it is sticking.

Then place the sandwich in a bowl of watter, and wait about one minute. The paper will float off, leaving the printer image on the copper. It is so cool! However, this ink is not good enough to be the resist.

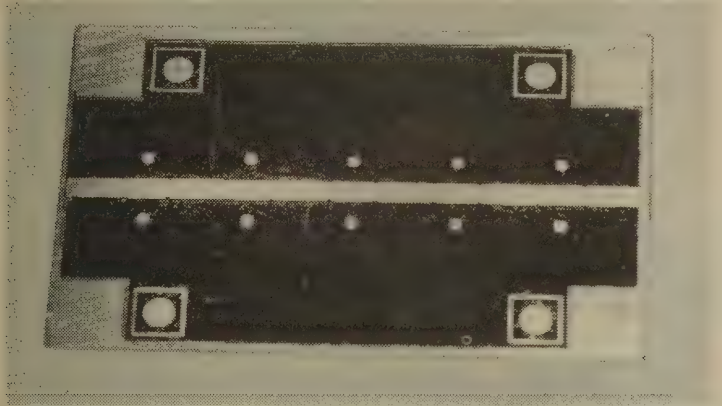
The kit comes with a special green film. Cut a piece large enough to cover the surface plus a little to fold under. You want to make sure that it lays flat and does not wrinkle like mine did. Do as I say, not as I do! Tape the green foil under the board with the dull side facing the copper and feed through the laminator just like you did the sandwich of paper and board.



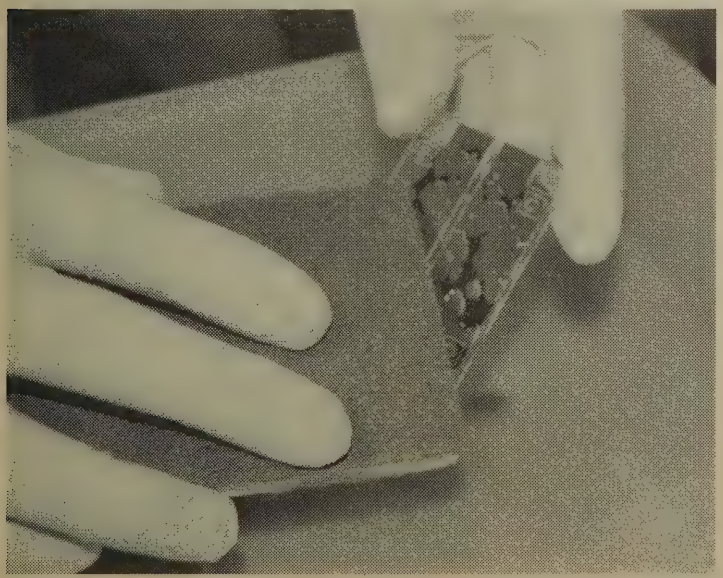
The green paper will stick to the ink and make a hard resist. Just peel the green film back and it will come off leaving only the inked areas covered.



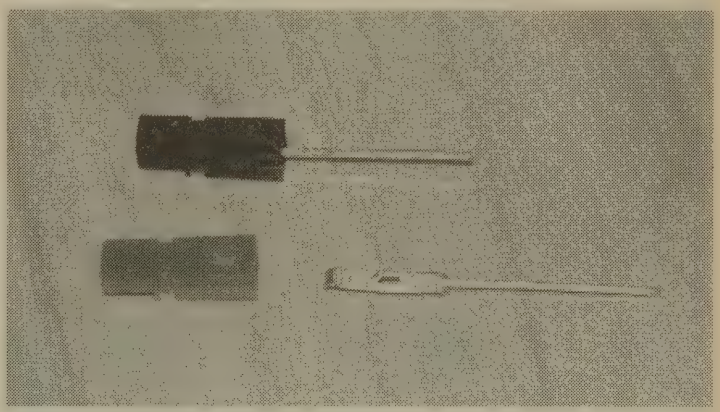
Since I had some wrinkles, I placed a second green sheet over the board and put it through the heat again. Above shows what the first sheet looked like when it was done and the second sheet is in place. Below shows the board ready for etching.



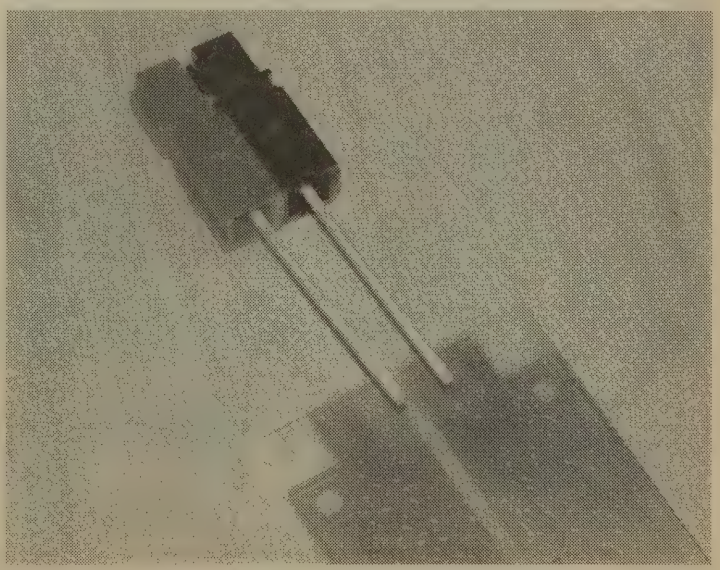
I bet that you have never seen a board etched like this before. All I did was pour a "little" Ferric Chloride on a sponge, just enough to wet the sponge. Then, using a plastic pan and gloves, brushed the board over and over. It was fully etched in about two minutes. One reason it was much shorter time than I have ever had before was that the board they ship is 1/2 ounce copper. I think some of the hamfest boards that I have laying around is probably 2 oz. copper and would take longer. I will have to

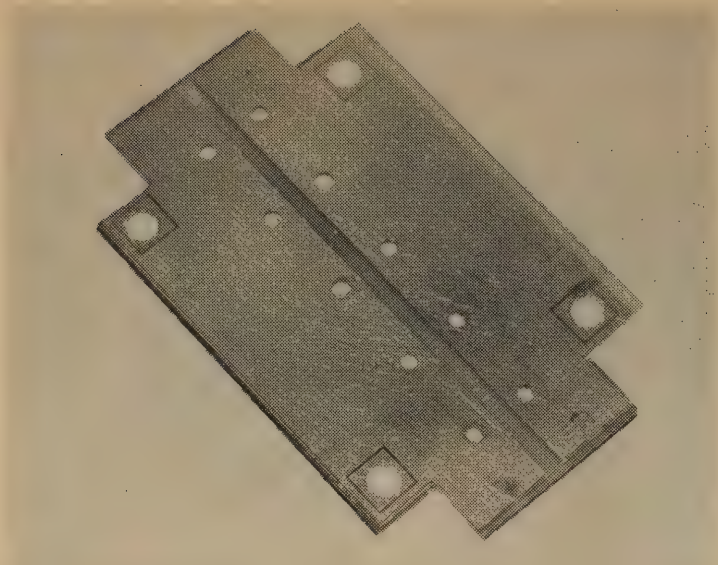


make a test. The fully etched board is shown above. The green resist comes off easily with Acetone and paper towel.

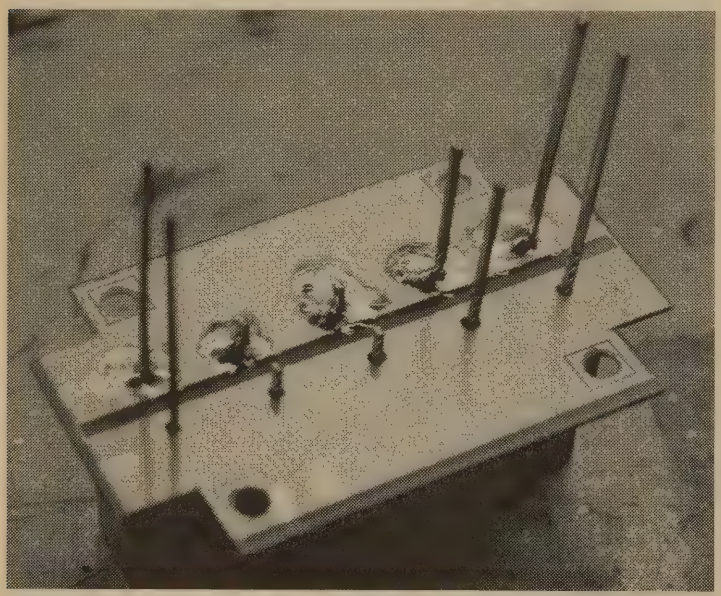


The photo above shows the Anderson Powerpole connectors. Most of us are more familiar with the metal part that crimps on the wire. These are made for PC boards and the part number I liked best was 1377G13. The reason that in some of the pictures the legs look different lengths is because I had a variety of part numbers that I was testing. In the photo below, I was just checking to make sure everything was going to line up.





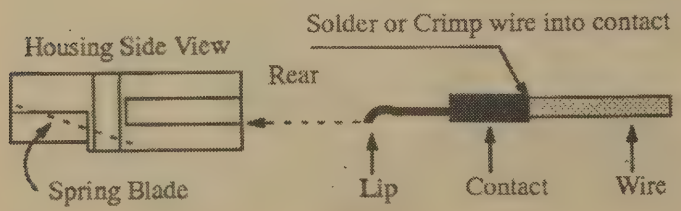
Above shows all the holes have been drilled and the corners cut so it might fit in a box that I might find at Radio Shack.



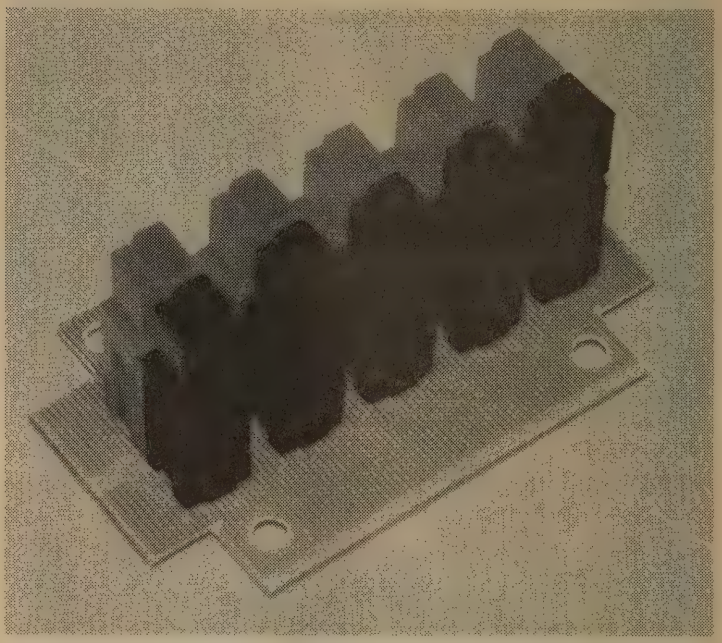
Then on to soldering. First one side was soldered so the plugs could be aligned with each other. Here you can see the different length pins that they have. The part number 1377G13 that I prefer has the shortest length of pin.

These pins insert the same as the kind that go on wire. Use a needle nose pliers to grab and push the pin in until it snaps.

In additions to the green film that gives the hard coating, the kit also comes with white film that can be used for silkscreen such as labels for all your connections.

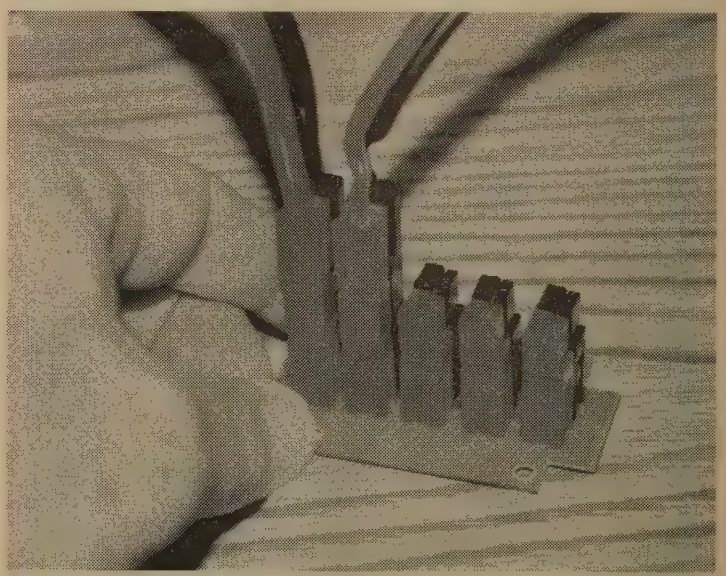


Here is the completed unit ready for test. The intent is to find a box to put it in and there are screw holes for mounting the board.



And testing the board worked just fine. Make sure that you check with an ohmmeter to make sure that critical areas are not shorted.

This distribution block is going to come in handy in the van. I use Anderson Powerpoles as much as I can so I can plug in anywhere. I understand that the ARES groups across the country are pushing for this as well, so when you bring your equipment to a



disaster area, everyone will have the same plugs to connect to for power. While these connectors are not the cheapest, they do work. And making your own distribution block sure beats the cost of buying on. The big one I have at home was around $120 if I remember right. It has more though as every circuit is fused and it even has an overpower indicator. Then again, you could make yours more fancy than mine.

Have fun!

ATVQ

Crazy Talk - Let's Make ATV Fun Again

By: Gene Harlan, WB9MMM Email: ATVQ@hampubs.com
5931 Alma Dr.
Rockford, IL 61108

We watch it all the time on commercial TV, talking animals trying to sell something. Why do they use talking animals? Because it gets your attention. So, why not have a little fun on ATV using talking animals (or my grandson likes to make talking rocks!).

Crazy Talk will do all the work for you, pretty much anyway. You can take a photo of just about anything and make it talk. What a neat idea for ID'ing your ATV station. Won't be too many others doing the same thing.

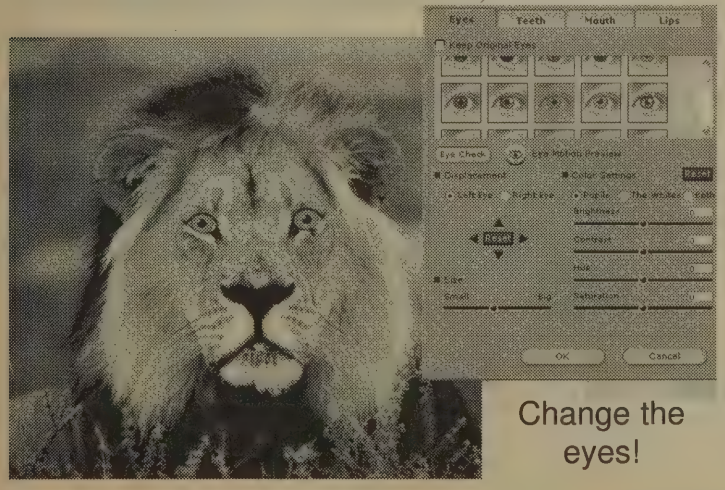
So, choose the picture you want, scan something in, take a picture of your pet (dog, cat, fish, whatever) and import into Crazy Talk. You will have lots of control over eyes, head movement, teeth, facial expression, and many other things.

I could see this being used to get kids interested in ATV. Try creating an educational program that kids would like that tells them about amateur radio and ATV.

I plan to have an ATV "personality" on our web page soon. You can also use these images with Skype, email, and web pages as well as using it to make a video.

Below you see the framework when you can adjust the personality of your picture. It does more than just move the lips. The whole head

Adjusting the frame for the face, eyes, nose and mouth

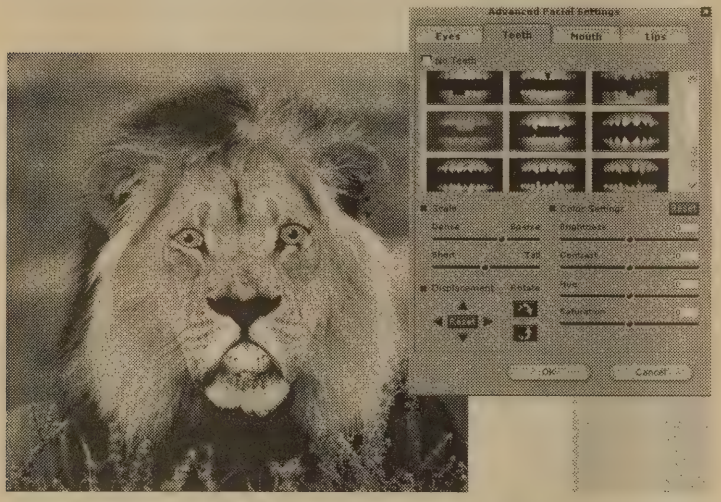


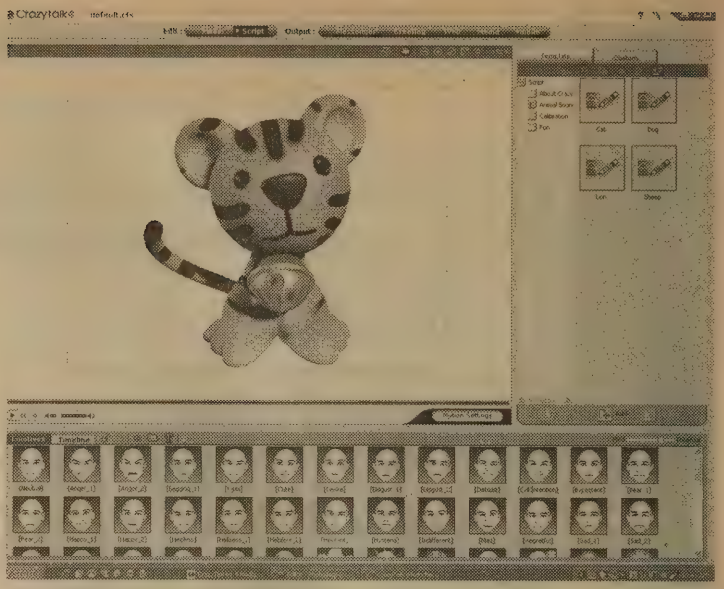
Change the eyes!

rotates as it would in real life, the eyes blink, and the nose even has action.

Below shows how you can choose the teeth that show when the object is talking. There are many choices as there is for emotions shown on the picture to the right. Each box at the bottom will cause different faitial movements.

You will have fun with this program, and it is reasonably priced, or at least I thought so. And there is a demo available on the





web site. The demo will put a watermark on anything that you save, and I think it is limited to 15 days. Go to: **http://www.reallusion.com/** and check it out. If you sign up, and don't buy it right away, you will get emails with specials from time to time. That is what I did, and got some free stuff with my order. I hope some of you have fun with this. Kids absolutely love it. Enjoy! ATVQ

New Product Announcement
ATV Transmitters and Receivers For Amateur Radio Use

Most of us have heard of the Comtech transmitter and receiver boards, and many of you have them, some using for repeater links, repeater receiver or transmitter, or just for fun. Here in Rockford, our main receiver for our ATV repeater is one of the 1.2 GHz boards. And those transmitting into the repeater are using the 1.2 GHz transmitter board with a proper amplifier.

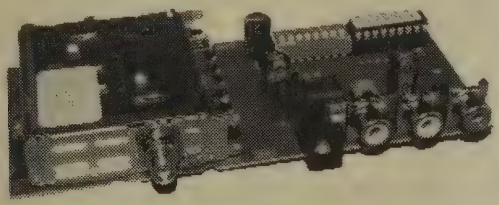
These boards do quite well, and there are articles around the Internet that talk about the boards and what you can do with them. One of the best sites is:
http://ve6sbs.sbszoo.com/ve6atv/equipment/hw.htm

Since there appears to be no one else selling them in the USA, I decided that I would take on the task. But, I only did this after learning how they work from a programming standpoint. Each one of these as they come from Tawain has frequencies that would be of no use to hams. So, if I was to sell them they had to be on amateur frequencies.

I had not done much programming in years, much less with a PIC. And how is I2C communications handled between the PIC and the Comtech module when the PIC chip does not have pins designed to use with I2C? I had learning to do, but it was fun! I still have ideas of things that I want to do, but they will come in time as my real job and playing tuba allows.

So what we have is listed below. More information and pricing should be on our web site by the time this gets into your hands. Check: **http://comtech.hampubs.com/**

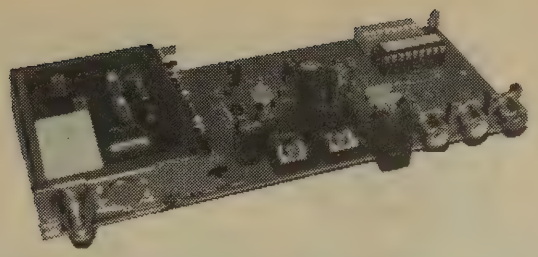
By the way, these units will only be sold to licensed amateur radio operators as the power is above Part 15 limits.



900 Mhz and 1200 Mhz Transmitter

Receives from 900 to 931.75 MHz and from 1.240 to 1.3035 GHz FM amateur television. With DIP switch number 8 ON the 900 MHz range frequency steps are 250 KHz by adjusting the DIP switches. Switching DIP switch 8 OFF changes the frequency range to the amateur radio 1.240 Ghz band and the frequencies can be adjusted in 500 KHz steps.

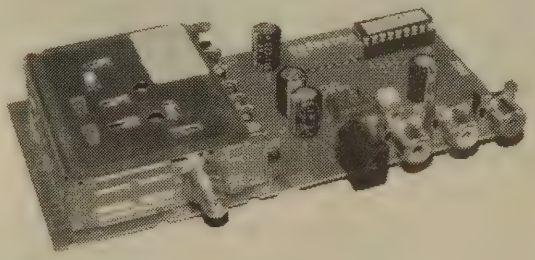
Required Power: 12-15 Volts DC - center positive
Yellow Plug - Video Out - NTSC composite
White Plug - Audio Out from 6.0 MHz subcarrier
Red Plug - Audio Out from 6.5 MHz subcarrier



900 Mhz and 1200 Mhz Receiver

Transmits from 900 to 931.75 MHz and from 1.240 to 1.3035 GHz FM amateur television. With DIP switch number 8 ON the 900 MHz range frequency steps are 250 KHz by adjusting the DIP switches. Switching DIP switch 8 OFF changes the frequency range to the amateur radio 1.240 Ghz band and the frequencies can be adjusted in 500 KHz steps.

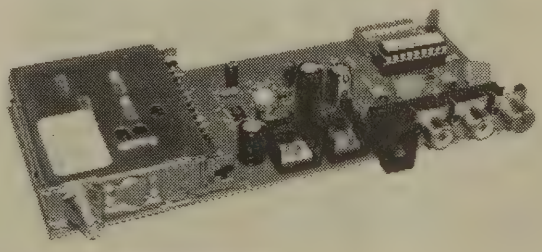
Required Power: 12-15 Volts DC - center positive
Yellow Plug - Video IN - NTSC composite
White Plug - Audio IN for 6.0 MHz subcarrier
Red Plug - Audio IN for 6.5 MHz subcarrier



1200 Mhz Transmitter

Transmits from 1.240 to 1.3035 GHz FM amateur television in 250 KHz steps.

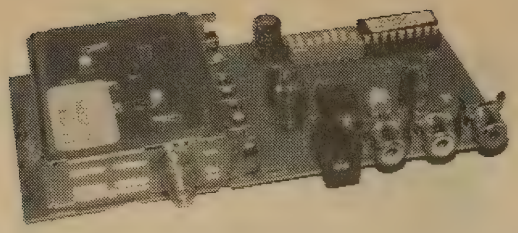
Required Power: 12-15 Volts DC - center positive
Yellow Plug - Video IN - NTSC composite
White Plug - Audio IN for 6.0 MHz subcarrier
Red Plug - Audio IN for 6.5 MHz subcarrier



1200 Mhz Receiver

Receives FM amateur television from 1.240 to 1.30375 GHz in 250 KHz steps.

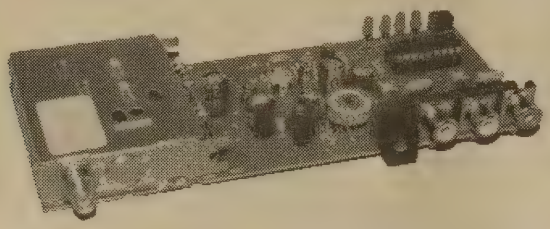
Required Power: 12-15 Volts DC - center positive
Yellow Plug - Video OUT - NTSC composite
White Plug - Audio OUT from 6.0 MHz subcarrier
Red Plug - Audio OUT from 6.5 MHz subcarrier



2.4 Ghz Transmitter

Transmits from 2.390 to 2.45375 GHz FM amateur television in 250 KHz steps. Power out is 200 mw!

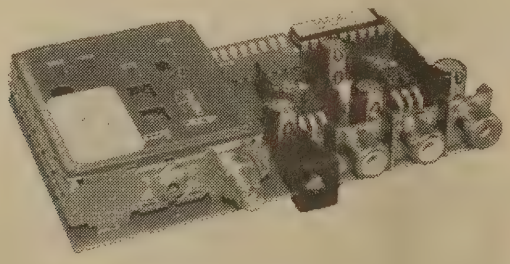
Required Power: 12-15 Volts DC - center positive
Yellow Plug - Video IN - NTSC composite
White Plug - Audio IN for 6.0 MHz subcarrier
Red Plug - Audio IN for 6.5 MHz subcarrier



2.4 Ghz Receiver

Receives FM amateur television on 2.398, 2.414, 2.428, and 2.438 GHz. The frequencies can be changed by pressing a button. The frequency is remembered if power is lost.

Required Power: 12-15 Volts DC - center positive
Yellow Plug - Video Out - NTSC composite
White Plug - Audio Out from 6.0 MHz subcarrier
Red Plug - Audio Out from 6.5 MHz subcarrier



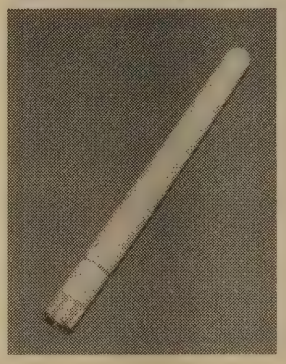
2.4 Ghz Transmitter - 200 mw !

Transmits from 2.390 to 2.45375 GHz FM amateur television in 250 KHz steps. Power out is 200 mw!

Required Power: 12-15 Volts DC - center positive
Yellow Plug - Video IN - NTSC composite
White Plug - Audio IN for 6.0 MHz subcarrier
Red Plug - Audio IN for 6.5 MHz subcarrier

1.2 Ghz Rubber Duck

2.4 Ghz Rubber Duck



So, for now, that is the line-up. We do not have large quantities as we have no idea how popular they might be. And when we re-order, we need to keep in mind shipping costs and import duties as they seem to stay pretty much the same for small orders. If we run out of an item, it might be a couple of months before stock gets replenished.

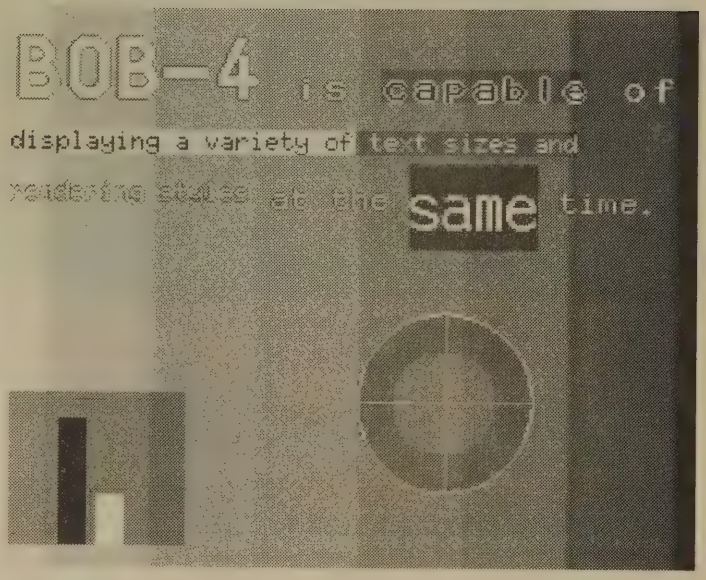
Make sure and check out the article on page 16, "ADD A 1.2 GHZ FM LINK TO YOUR AM OR FM ATV REPEATER" by John B. Watson, NY3K. Here he describes how he uses these modules for their repeater linking. He ordered his units from MobiComm in the Netherlands. We hope that having a local source with be useful to the ATV community.

I will try to answer as many questions about these units as I can, but I am learning about them as I go along. Searching on the Internet will provide lots of information, and we can learn together. If you are using, or start using the units, write up what you are doing and it might get published.

Gene - WB9MMM
ATVQ

DECADE ENGINEERING
Product Announcement

BOB-4-H
Video Information Overlay Module



BOB-4 is Decade's fourth-generation low-cost video information overlay (OSD) module. BOB-4 lets your microcontroller or PC display text and vector graphics on standard TV monitors. With huge user-definable character sets, BOB-4 also supports bitmap graphics and multiple languages. BOB-4 generates black background video on-board, or automatically genlocks to your video source and superimposes graphics over the image. Printable characters and commands drive BOB-4 through fast SPI or RS-232 style ports, much like a serial terminal or printer. BOB-4 links directly to microcontroller chips and modules, including the BASIC Stamptm. NTSC and PAL video standards are supported via software commands.

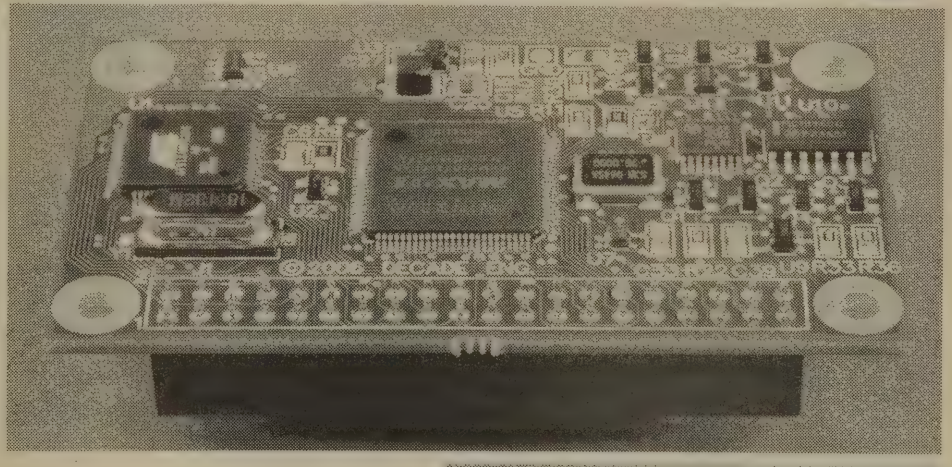
- Simple hookup; requires just DC, serial data, video I/O
- Prints plain ASCII text in default configuration
- High display density; up to 480x240 (NTSC) or 480x288 (PAL)
- Arbitrary font sizes and proportional font support
- Stores thousands of custom characters (off-board option)
- Vector graphics drawing commands
- Industry-standard ANSI control protocol (ECMA-048)
- Automatic vertical scrolling
- Text crawl (single-line smooth hori zontal scroll)
- Async, Synchronous, and SPI host communication options
- Automatic video mode control (local/genlock)
- Customer-configurable video stan dards (NTSC/PAL)
- Stand-alone operation for simple source ID, target reticle, etc.
- Software-controlled digital outputs (5)
- Consumes only 1/2W at +5VDC
- Lead-free; industrial temperature spec available
- Extended production lifetime; no OSD chips!
- Firmware can be upgraded in the field
- Independent debug port assists with application devel opment

The free BOB-4 Conscriptor program runs on Windows PCs and offers these conveniences:

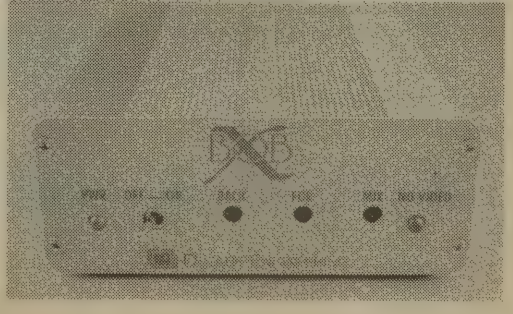
- Font editing, importing, file management
- Bitmap graphics importing and editing
- Boot script editing and file management
- BOB-4 configuration memory management
- BOB-4 firmware upgrade utility
- One-click BOB-4 module configuration

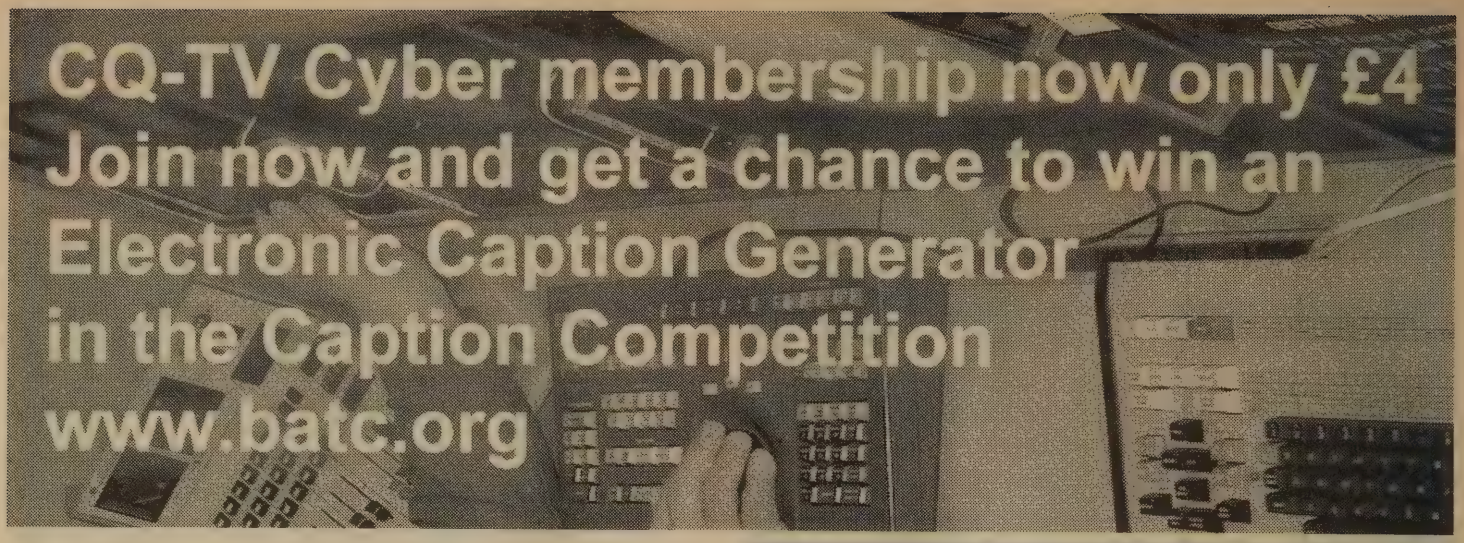
See **www.decadenet.com** for complete BOB-4 Application Guide and prices

ATVQ



Also available in a cabinet as XBOB-4





CQ-TV Cyber Subscription

BATC has reduced the cost of their Cyber subscription to CQ-TV magazine, from £10 to £4 , CQ-TV is the leading ATV magazine covering all aspects of television from electronics hobbyist to studio manager. It is published four times a year in the UK. You can subscribe on line and then as each magazine goes to press you will be emailed a link where you can download your own personal copy. The cyber version of the magazine is in full colour and is in the form of a PDF file of around 8 to 10Mb. If you think its for you why not go and have a look at some of the back issues on the CQ-TV website they can all be down loaded for free with the exception of the last 4 issues.

See **www.batc.org.uk**

Or **www.CQ-TV.com**

TV News

CQ-TV Magazine subscription now from £4 per year see www.cq-tv.com

PCATV Test Pattern Generator

Here is an Internet site that has a program to generate ATV Test patterns with your PC.

http://members.lycos.co.uk/plasmaball/index.htm

Worldwide Tropospheric Ducting Forecasts

Don't forget to watch these sites to know when the ATV DX is good.

http://www.dxinfocentre.com/tropo.html

http://dxworld.com/atvlog.html

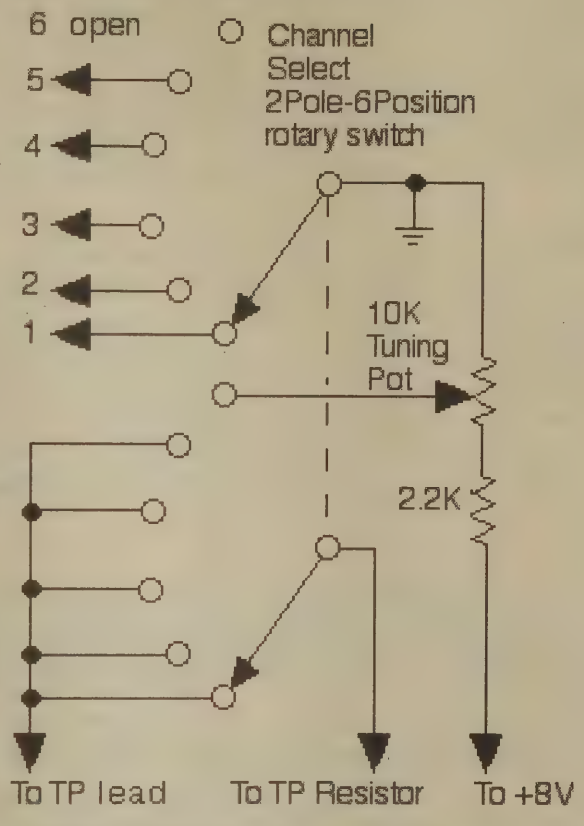
P. C. Electronics 2522 Paxson Lane Arcadia CA 91007-8537 USA
Tel: **1-626-447-4565** m-th 8am-5:30pm pst (UTC - 8) Tom (W6ORG) & Mary Ann (WB6YSS)
Web: www.hamtv.com Email: ATVinfo@hamtv.com

ORGy Notes

By Tom O'Hara, W6ORG

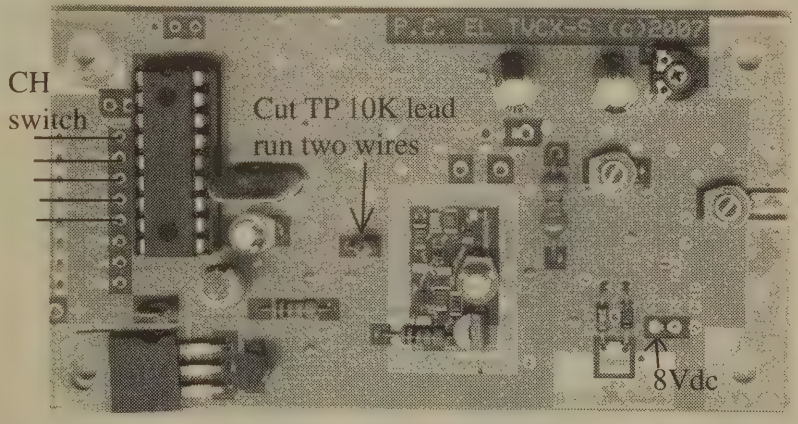
Variable Tuning for the TVCX-xS ATV Downconverter

Some have expressed a desire to have the best of both worlds as far as ATV frequency selection - crystal controlled and variable tuning. The current production P. C. Electronics ATV downconverter has the 5 standard USA ATV channels switch selected and programmed to output on a TV channel crystal locked with a synthesizer. This way there is no drift with temperature or accidental nudge of the variable tuning knob to distort or loose the picture. It also allows splitting out to multiple TV's or VCR's which is difficult with a tuneable downconverter given differences in the automatic frequency control range between TV receivers.



Variable tuning allows tuning in non-standard ATV frequencies or fine tuning into the peak of a narrow band TV channel filter to pick up sync bars when searching for DX.

The local oscillator frequency in the TVCX-xS series ATV downconverter is controlled by the DC voltage applied to a varicap. The synthesizer presents an error voltage from 0 to 8V that drives the varicap to the selected frequency and then maintains the locked DC voltage. In the tuneable downconverters, this control voltage was done with a 10K pot connected to the regulated 8V.



Switching between the 5 crystal controlled channels and variable tuning is easy as can be seen from the schematic. There may not be a good space on the front panel and a side panel may have to be used for the pot or swap with the switch. Electrical modification is an easy matter of just cutting the exposed test point - TP - 10K resistor lead about 1/8th of an inch from the resistor body and running two leads to the rotary switch. In switch position 6, no channels are selected at the micro processor inputs that tell the synthesizer what division of the oscillator to count down to equal the 4 MHz crystal reference, and the other bank of the switch connects the wiper of the added 10K tuning pot to the varicap rather than the synthesizer error voltage. There is a regulated 8 Vdc solder pad on the downconverter board that is jumpered to power the preamp stage that can be used to connect the 2.2K resistor to.

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ATVQ will pay for certain articles that it publishes. I will outline the policy here, but it will be subject to change as needed to make sure that ATVQ continues to be an ongoing publication. ATVQ will pay $25.00 for technical articles that are published and are a minimum of 2 pages. While this is not a great amount, I hope it will encourage more technical type articles to be written. Exceptions will be articles that are written by a manufacturer/seller of equipment that is being written about. While I do not want to discourage this type of article, the article itself is an advertisement of the product. Articles from clubs will be encouraged, and I would expect they would like to share their information with the ATVQ readership. Information gathered from the Internet will not be paid for and is mostly small filler items.

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CONTRIBUTORS GUIDE

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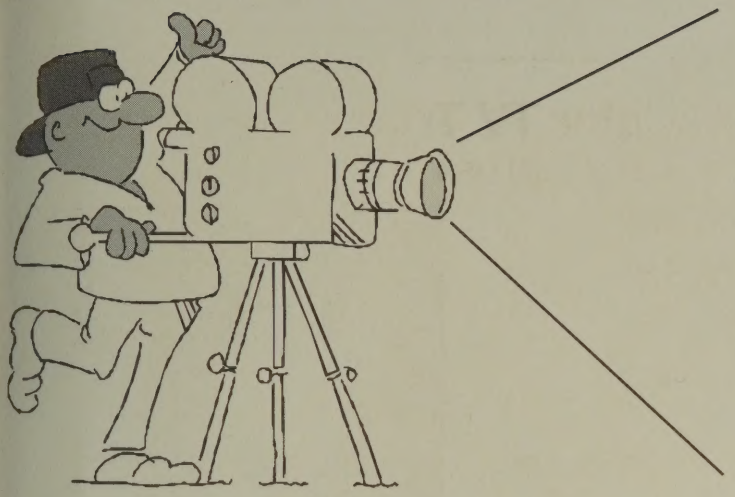

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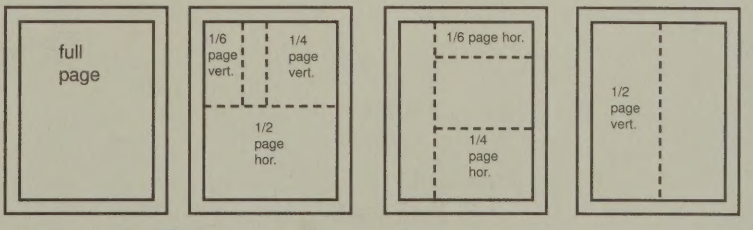

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